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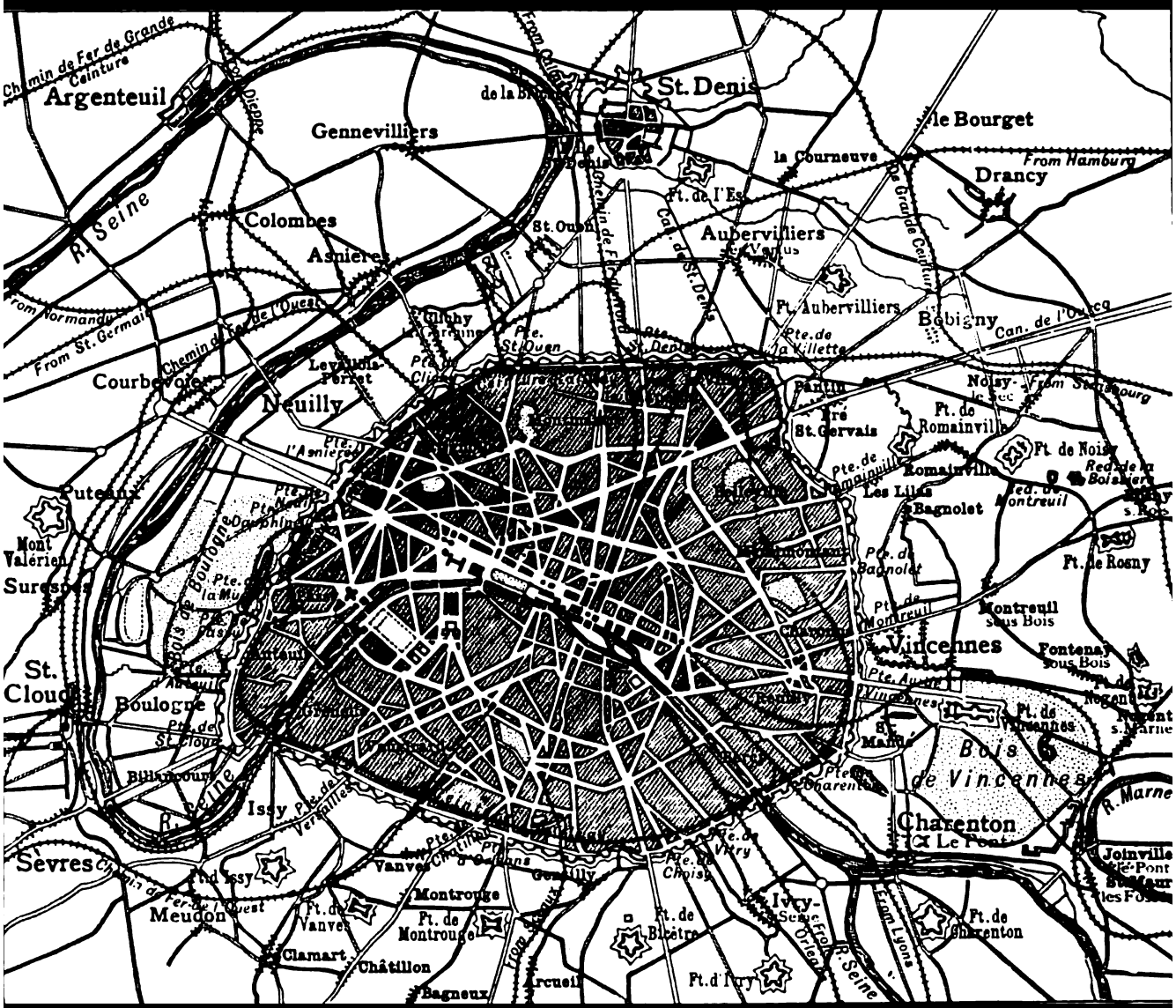

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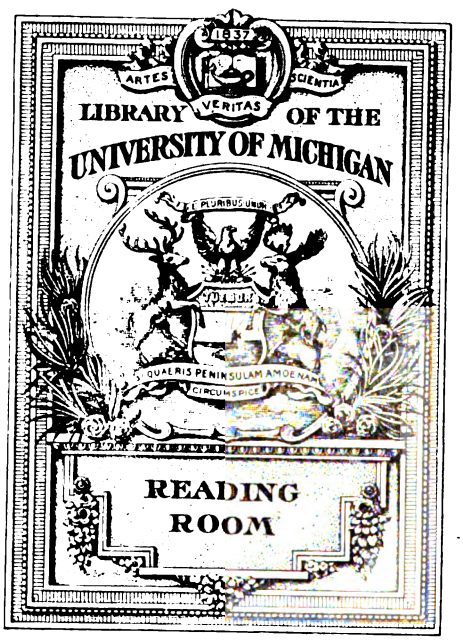

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A DICTIONARY

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NEW EDITION

VOL. VII.

MALTEBRUN TO PEARSON

WILLIAM & ROBERT CHAMBERS, LIMITED
LONDON AND EDINBURGH
J. B. LIPPINCOTT COMPANY, PHILADELPHIA
1891

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The Publishers beg to tender their thanks, for revising or correcting articles in this Volume, to the Earl of Southesk; the Very Rev. the Dean of Norwich; the President of Maynooth; Professor Max-Müller; the Head-master of Marlborough College; the Registrar of Owens College; the town-clerks of Northampton, Nottingham, &c.; Mrs Oliphant and Miss Nightingale; Colonel Babbage; Mr John Murray, publisher; and Mr Gardner, Paisley.

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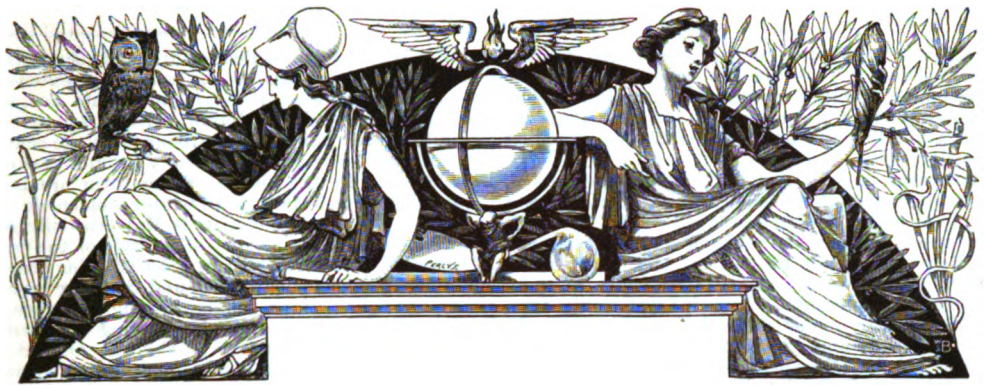

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Maltebrun, KONRAD (properly MALTHE CONRAD BRUUN), geographer, born 12th August 1775, at Thisted, in Jutland, studied in Copenhagen, but was banished in 1800 because of his having openly shown his sympathy with the French Revolution. He sought refuge in Paris, where he supported himself by teaching and literary labours. With Mentelle and Herbin he compiled a *Géographie Mathématique du Monde* (16 vols. 1803–7); and in 1808 he began *Annales des Voyages, de la Géographie, et de l'Histoire* (24 vols.), in 1818 *Nouvelles Annales*. His principal work is a *Précis de la Géographie Universelle* (8 vols. 1810–29; latest ed. 6 vols. 1872). He also contributed to the *Dictionnaire de la Géographie Universelle* (8 vols. 1821), and took an active part in founding the Geographical Society of Paris. He died 14th December 1826.—His son, VICTOR ADOLPHE MALTEBRUN (1816–89), was professor of History and Geography at the college of Pamiers and subsequently at Paris (1848–60); and from 1860 onwards he was secretary of the Geographical Society of Paris. He was the author of numerous geographical works, as *La France Illustré* (new ed. 1879–84), *L'Allemagne Illustré* (1884–86), *Histoire Géographique et Historique de l'Allemagne* (1866–68), &c.

Maltese Cross. See CROSS.

Maltese Dog, a small kind of spaniel, with roundish muzzle, and long, silky, generally white hair. It is fit only for a lapdog.

Malthus, THOMAS ROBERT, the expounder of the theory of population, was born 14th February 1766, at the Rookery, near Dorking, in Surrey, where his father owned a small estate. He was ninth wrangler at Cambridge in 1797, was elected Fellow of his college (Jesus), took orders, and was appointed to a parish in his native county. In 1798 he brought out his *Essay on the Principle of Population*, which attracted great attention and met with no little criticism. During the following years Malthus extended his knowledge of the subject both by travel and by reading, and in 1803 published a greatly enlarged edition of his essay. In 1805 he married happily, and soon after was appointed professor of Political Economy and Modern History in the East India Company's college at Haileybury, a post which he occupied till his death at Bath on 29th December 1834.

Personally Malthus was a kindly and accomplished man, who followed what he believed to be the truth, and who endured without a complaint the abuse and misunderstanding to which his writings exposed him. The aim of the *Essay* was to supply a reasoned corrective to the theories regarding the perfectibility of society, which had been diffused by Rousseau and his school, and which had been advocated in England by Godwin. Malthus maintained that such optimistic hopes are rendered baseless by the natural tendency of population to increase faster than the means of subsistence. He pointed out that both in the animal and vegetable kingdoms life was so prolific that if allowed free room to multiply it would fill millions of worlds in the course of a few thousand years. The only limit to its increase is the want of room and food. With regard to man, the question is complicated by the fact that the instinct of propagation is controlled by reason; but even in his case the ultimate check to population is the want of food, only it seldom operates directly, but takes a variety of forms in accordance with the complexity of human society. The more immediate checks are either preventive or positive. The former appear as moral restraint or vice. The positive checks are exceedingly various, including 'all unwholesome occupations, severe labour and exposure to the seasons, extreme poverty, bad nursing of children, large towns, excesses of all kinds, the whole train of common diseases and epidemics, wars, plague, and famine.' Malthus goes on to illustrate the action of his principle by

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a review of the history of the different nations and races, showing what are the actual checks that have limited population—celibacy, wars, infanticide, plagues, vicious practices—and proving that the population difficulty has affected the development of society from the beginning.

It cannot be said that Malthus was original in his exposition of the theory of population. It is a theme of both Plato and Aristotle. Shortly before the time of Malthus the problem had been handled by Benjamin Franklin, Hume, and many other writers. Malthus crystallised the views of those writers, and presented them in systematic form with elaborate proofs derived from history. In certain details and in the form of exposition the *Essay* may be criticised; but the broad principles of it can be doubted only by those who do not understand the question. The enormous increase of the means of subsistence attained by colonisation and modern industrial development has only for a time postponed the population difficulty for the world at large, while its pressure is still felt in the more thickly peopled centres both of Europe and of the East. At the present time the most interesting feature of Malthus is his relation to Darwin. Darwin saw 'on reading Malthus *On Population* that natural selection was the inevitable result of the rapid increase of all organic beings,' for such rapid increase necessarily leads to the struggle for existence. To prevent misunderstanding it should be added that Malthus gives no sanction to the theories and practices currently known as Malthusianism. In this reference Malthus approved only of the principle of moral self-restraint; 'do not marry till you have a fair prospect of supporting a family.' Besides his *Essay on the Principle of Population* Malthus wrote two important works, *An Inquiry into the Nature and Progress of Rent* and *Principles of Political Economy*. See Memoir by Dr Otter, Bishop of Chichester (prefixed to 2d ed., 1836, of the *Principles of Political Economy*); also Bonar's *Malthus and his Work* (1885).

Malton, a town in the North and East Ridings of Yorkshire, on the Derwent, 22 miles NE. of York. It consists of New Malton, Norton, and Old Malton. The *Derventio* probably of the Romans, it has the Norman church of a Gilbertine priory (1150), and a free grammar-school, founded in 1545 by Archbishop Holgate; but no trace remains of a Norman castle. Iron and brass founding, tanning, brewing, &c. are carried on; and Norton is famous for its training stables. Till 1868 Malton returned two members, and then till 1885 one. Pop. (1851) 7661; (1881) 8754.

Malvaceæ, a natural order of exogenous plants, of which about 1000 species are known, chiefly tropical and most abundant in America, although the most important species belong to the Old World. They are herbaceous plants, shrubs, and occasionally in tropical countries trees; with alternate entire or lobed leaves; the flowers showy, generally on axillary stalks. The plants of this order have a great general similarity both in appearance and in properties and products. All contain a mucilaginous substance in great quantity, and some are very useful as an emollient and demulcent in medicine. The seeds contain a considerable quantity of bland fixed oil. The inner bark of the stem often yields a useful fibre, for which species of Hibiscus and Sida are particularly valued; and to this order belong the cotton plants.—See COTTON, HIBISCUS, HOLLYHOCK, MALLOW, MARSH-MALLOW, &c.

Malvern, GREAT, one of the most fashionable watering-places in England, is situated 9 miles SW. of Worcester, and 129 WNW. of London, on the east side of the Malvern Hills, at the foot of the Worcestershire Beacon, from the summit of which (1444 feet above the sea-level) extensive views are obtained. It is irregularly laid out, and has a fine cruciform church, with a square embattled tower 124 feet high rising from the centre, rebuilt in the reign of Henry VII., and restored in 1860–1. In the centre of the town are large Assembly Rooms (1884) with winter promenade and gardens, and on the outskirts is Malvern College, a handsome building in the Gothic style of the early Decorated period, erected in 1863–65: the present number of boys is nearly 250, and there are several entrance scholarships, tenable during residence, of from £87 to £30 a year, and a leaving scholarship of £50 for three years, tenable at Oxford or Cambridge. Madame Goldschmidt (Jenny Lind) resided near Malvern for many years previous to her death. Pop. (1801) 819; (1881) 7934. See *Blackwood's Magazine* for August 1884.

Malwa, a former kingdom of India. See CENTRAL INDIA.

Mamelukes, properly MAMLÛKS, an Arabic word signifying white slaves captured in war or purchased in the market, and especially applied to the slave-kings in Egypt. These had their origin in the importation of a large number of Turkish slaves, from the regions of the Caucasus and Asia Minor, by Es-Sâlih Ayyûb, grand-nephew of Saladin, and sultan of Egypt, in the middle of the 13th century. They were intended to act as a bodyguard and to defend their master against his numerous rivals as well as against the Crusaders, and they fulfilled their duty well, as is shown by the success of their repulse of the French invasion and the capture of St Louis in 1249. In the absence of capable successors to Es-Sâlih, his Mamelukes set up one of their own number as sultan of Egypt in 1250, and from that year to the Ottoman conquest in 1517 that country and Syria were ruled exclusively by Mameluke sultans. They were forty-eight in number, often retaining the throne but a few years, or even months, in consequence of the intrigues of rival emîrs; and they fell into two dynasties, the Bahrî or Turkish Mamelukes (1250–1390) and the Burji or Circassian (1390–1517). The sultan was chosen out of the military oligarchy, and owed his throne to personal prowess and the support of the biggest battalions, rarely to hereditary title. The Mamelukes did not readily propagate their race in a foreign country, and fresh importations were necessary to keep up the stock. As a rule the most powerful lord of the day became king, and kept his place just so long as he retained his following. Violent deaths were common; the sultan's bodyguard was the most essential part of the constitution, and held a large portion of the land of Egypt on a species of feudal tenure. Each of the great lords was a Mameluke sultan in miniature, kept a bodyguard, lived in much state, and was generally prepared to fight his way to the throne should occasion favour the attempt. The streets of Cairo were frequently the scenes of sanguinary conflicts, and its citadel is full of the memories of treacherous assassinations. With all their excesses, however, it may be doubted whether Egypt ever since the days of the Pharaohs possessed a more enlightened series of rulers than the Mamelukes. Their system of law and police, their military organisation and naval enterprise, their postal service, their irrigation-works and engineering operations were far in advance of their time; and, rough soldiers as they appear, they were munificent patrons of art and literature. Nearly all the exquisite mosques that still adorn Cairo, essentially *the* Mameluke city, are of their building, educational institutions met with their unfailing support, and they carried their taste for refinement into the

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smallest details of house furniture and decoration. The museums of Europe and Cairo are full of their delicate inlaid and engraved brass-work, wood carvings, ivory reliefs, enamelled glass, tiles and stone and plaster work, mosaic pavements, and silk embroideries. Their court ceremonies were gorgeous with the pomp of heraldry and armour and dazzling robes; their luxury at home was stupendous. Turks as a rule, they had tastes beyond the ken of the Ottoman Turks who dispossessed them in 1517, and Egypt has not yet recovered from their loss. After the Turkish conquest the government was placed in the hands of an Ottoman pasha assisted by a council; whilst twenty-four Mameluke beys were allowed to administer the provinces. The beys retained most of the power, however, and the pasha became a cipher. Their last brilliant achievements were on the occasion of Napoleon's invasion of Egypt in 1798, when they fought the disastrous battle of the Pyramids near Cairo; but after the retirement of the French and British armies Egypt became a prey to disorder, rival Mamelukes fought and intrigued, and order was not restored until Mohammed Ali established his authority as pasha under the Porte, and by two treacherous massacres, in 1805 and 1811, exterminated the Mameluke princes, save a small remnant who took refuge in the Sûdân, where their mediæval armour was recently seen by the British forces employed against the Mahdi.

See Quatremère, Makrizi's *Histoire des Sultans Mamlouks;* S. Lane-Poole, *Art of the Saracens in Egypt.*

Mamers, a town in the French department of Sarthe, on the Dive, 43 miles by rail NNE. of Le Mans. Pop. 6288.

Mamiani della Rovere, COUNT TERENZIO, an Italian scholar and statesman, born in 1800 at Pesaro in the Romagna, took a prominent part in the futile outbreak at the accession of Gregory XVI., and was compelled to flee to Paris, whence he returned to Rome in 1848 after the unconditional amnesty of Pius IX., and actually held office for three months in the papal ministry. He next withdrew to Turin, where he founded, with Gioberti, his famous society for promoting Italian unity. On the flight of Pius IX. from Rome to Gaeta he re-entered the political arena, and was for a short period foreign minister in the revolutionary cabinet of Galetti. On the fall of Rome he retired to Genoa; in 1856 he was returned member of the Sardinian parliament, and in 1860 entered Cavour's ministry as minister of Instruction. He was appointed ambassador to Greece in 1861, to Switzerland in 1865, and died at Rome, 21st May 1885.

Among his writings are *Del Rinnovamento della filosofia antica Italiana* (1836), *Poeti dell' Età media* (1842), *Del Papato* (1851), *Confessioni d'un Metafisico* (1865), *Teorica della Religione e dello Stato* (1868), *La Religione dell' Avenir* (1879), besides books on special social and philosophical problems, and treatises on various subjects. See his Life by Gaspari (1887).

Mammals (*Mammalia*, Lat. *mamma*, 'a teat') form what is usually considered the highest class of backboned animals, including numerous orders, of which horse, elephant, and whale, dog, beaver, and bat, anthropoid ape, and man himself are in different ways prominent illustrative types. Compared with birds, mammals are most notably characterised by the greater development of their brains, and by the close connection between mother and offspring; but in both these respects there are grades of excellence. Thus, the Monotremes (see ORNITHORHYNCHUS, and ECHIDNA) have simple brains and lay eggs; the Marsupials (q.v.) have also lagged behind in cerebral development and bring forth their young precociously after a short gestation; while in the higher orders there are many steps in the perfecting of brains and wits, and in the evolution of the organic connection between the unborn young and the mother. The habitats are also very varied, for though the great majority are *terrestrial*—burrowers, runners, leapers, and climbers, a thoroughly *aquatic* habit is exhibited by the cetaceans, the sea-cows, the seals and walruses, and many genera here and there, while the bats have the power of true flight, and many swooping forms, such as the flying opossums, squirrels, and lemurs are more or less *aërial* (see FLYING ANIMALS). Similarly as regards food there is great variety, for fruit and insects, fish and herbs, roots and flesh, are all utilised, and the diversity of diet is associated with marked differences in Dentition (q.v.). About 2300 living species have been recorded, varying in size from the smallest harvest-mouse, which is scarcely the weight of a halfpenny, to the giant whales, which approach 100 feet in length.

General Characters.—It will be useful to refer to the article BIRDS, where the three highest classes of vertebrates are contrasted; but a more detailed summary is now necessary. Female mammals always nourish their young for some time after birth with the milk produced by the mammary glands. Except in the oviparous Monotremes, the young are born viviparously; and in all mammals above Marsupials the embryo in the womb is organically connected with the mother by means of a Placenta (q.v.). The skin always bears at least some hairs, and these usually cover the whole body, so that most mammals may be justly called furred quadrupeds. In body-temperature, which is some index to the pitch of the life, mammals, though inferior to birds, are emphatically warm-blooded; and in this connection we may notice that a complete muscular partition (midriff or diaphragm) separates the breast from the abdominal cavity. The lungs lie freely and are invested by (pleural) sacs; the heart is four-chambered and gives off a single aortic arch to the *left* side (to the *right* in birds); the red blood-corpuscles are non-nucleated when fully formed. The parts of the adult brain show a greater curvature than in lower forms, while the cerebral hemispheres predominate, become more and more convoluted, and are united by an important bridge called the corpus callosum. Except in Monotremes, the rectal and the urino-genital apertures are separate; and, with the same exception, the ova are small and poor in yolk, and undergo total segmentation. The skeletal characteristics are necessarily more technical, but it is important to notice that the skull moves not on one condyle as in birds and reptiles, but on two as in amphibians; the lower jaw is a single bone on each side, and articulates not with the quadrate as in Sauropsida but with the squamosal; a chain of three ear-ossicles (malleus, incus, and stapes, probably equivalent to the articular, quadrate, and columella or hyo-mandibular of lower forms) connects the drum with the internal ear; the teeth, rarely quite absent, are set in distinct sockets; the vertebræ of the neck are (with three exceptions) seven in number; the coracoid bone (except in Monotremes) is a mere process of the scapula; and so on. As the various systems are dealt with in special articles (see BRAIN, CIRCULATION, HAIR, SKULL, &c.), it seems unnecessary to expand the above summary.

The Sub-classes of Mammals.—In 1816 De Blainville divided mammals into three sub-classes, which subsequent investigation has firmly established. The two orders of Monotremes (duckmole and Echidna) and of Marsupials (kangaroo, opossum, &c.) he raised to the rank of sub-classes under the titles Ornithodelphia (lit. 'bird-wombed') and Didelphia (lit. 'double-wombed'), in contrast to all the other mammals, which he termed Monodelphia.

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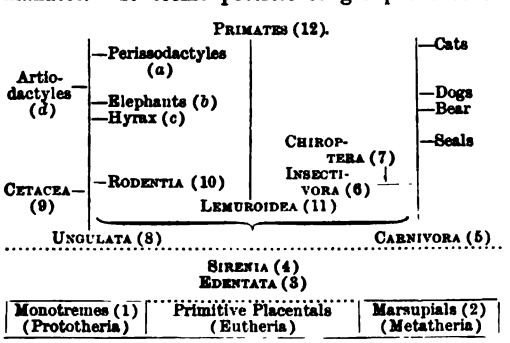
For these three sub-classes, which are distinct enough to be regarded as separate branches of the primitive mammalian stock, Huxley proposed the less objectionable titles Prototheria, Metatheria, and Eutheria, which are now generally adopted. The most important contrasts between them may be summarised in the following tabular scheme, which ought to be expanded and vivified by reference to the articles ORNITHORHYNCHUS, ECHIDNA, KANGAROO, MARSUPIAL, &c.

	Prototheria. Ornithodelphia. Monotremes.	Metatheria. Didelphia. Marsupials.	Eutheria. Monodelphia. Placentals.
PARTURITION	Oviparous; obviously no placenta; (a temporary pouch in Echidna).	Precociously viviparous; placenta incipient; (a pouch for the young except in some opossums).	Viviparous; placenta established in various forms.
OVA	Large, rich in yolk, with a slight shell, with partial segmentation.	Small, with total segmentation and relatively large yolk-sac.	Small, with total segmentation. The yolk-sac is small except in Rodents, Insectivora, and Bats.
MAMMÆ	None; the glands open on a bare patch of the skin, whence the secretion is licked off by the young.	Teats lie within the pouch, if that be present, and the milk is forced into the mouth of the young.	The well-developed teats are sucked by the young.
BRAIN	Small corpus callosum. Large anterior commissure. Cerebellum uncovered.	Small. Large. Uncovered.	Large. Small. Increasingly covered.
TEMPERATURE	25°–28° C.	32°–36° C.	35°–40° C.
SKELETON	The sutures of the skull-bones close, and the surface is polished. The rami of the lower jaw are free and without an ascending process. The three ear-ossicles have primitive characters—e.g. large malleus, small incus, rod-like stapes. The vertebræ have no terminal caps or epiphyses (as also in Sirenia). The pectoral girdle is reptilian-like, with coracoids reaching sternum, with 'interclavicle,' &c. There are marsupial or epipubic bones. No teeth in adults.	The angle of the lower jaw is inflected sharply inwards. There are the usual epiphyses, much reduced coracoids (mere processes of the scapulæ), and almost always epipubic bones. The dentition is in most cases peculiar.	The typical characters of mammalia already noted. No epipubic bones, or at most slight rudiments of them; no marked inflection of the angle of the lower jaw.
OTHER PECULIARITIES	Heart somewhat bird-like. Cloaca persists. Oviducts very simple and quite separate. The testes abdominal, and the ureters open into cloaca. Vasa deferentia are not continuous with the penis.	The urinogenital aperture is separate from the rectal, but there is a slight cloaca. Ureters open into bladder. There are two uteri and two vaginæ. The scrotum lies in front of the penis.	Ureters open into bladder; one vagina, and usually one uterus. Scrotum, if present, lies behind the penis.

Orders of Mammals.—Leaving the MONOTREMATA (1)—duckmole and Echidna—and MARSUPIALIA (2)—kangaroo, opossum, &c.—by themselves in marked contrast to one another and to the placental series, we begin the latter with two orders in many ways more primitive than the rest—viz. the EDENTATA (3)—sloths, ant-eaters, armadillos, &c.—and the SIRENIA (4)—dugong and manatee. It seems possible to group the other



orders along three definite lines. One of these is especially marked by the CARNIVORA (5)—cats, dogs, bears, and seals—to which the INSECTIVORA (6)—hedgehogs, moles, shrews—are apparently allied, while these in turn lead to the divergent CHIROPTERA (7) or bats, and to an aberrant genus—the flying lemur or Galeopithecus, for which some would erect a special order. Another line is especially characterised by the great order UNGULATA (8), including (*a*) Odd-toed or Perissodactyle forms—horse, rhinoceros, tapir, &c.—(*b*) Proboscideans or elephants, (*c*) the unique genus Hyrax, and (*d*) the Even-toed or Artiodactyle forms—sheep and cattle, chevrotains, camels, hippopotamus, and pigs. But with the Ungulates there are many reasons for connecting two other orders, the CETACEA (9)—whales and dolphins—and the RODENTIA (10)—rats, hares, squirrels, &c. Finally, along a third branch, which probably had its origin in a stock common to the Ungulates on the one hand, to the Carnivores and Insectivores on the other, we have to place the LEMUROIDEA (11)—lemurs—and the PRIMATES (12), the latter including the marmosets, the New-World monkeys, the Old-World monkeys, and man himself.

Extinct Mammals.—(*a*) The oldest mammalian remains date from the Upper Trias—i.e. from near the beginning of the Mesozoic or Secondary system. Thus, fragments of a small animal known as Dromatherium suggest a primitive type, possibly ancestral to the Monotremes. (*b*) In Jurassic strata remains of small mammals are locally abundant, and represent more than one type of Marsupial. (*c*) From the next or Cretaceous period, the beds of which are mostly of marine origin, other small types have recently rewarded the unwearying researches of Professor Marsh. (*d*) In the beginning of the Tertiary period, however, most of the modern orders of mammals have put in an appearance, and, as one would expect, there are remains of many types which form the common base of branches now widely divergent. Thus, the *Creodonta* (e.g. Hyænodon

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and Proviverra) are primitive Carnivora, which show skeletal affinities with Marsupials and Insectivores. Not less remarkably generalised are the *Condylarthra* (e.g. Phenacodus and Periptychus), primitive Ungulates showing affinities with Artiodactyles and Perissodactyles, with Hyracoidea and (through the Creodonta) with Carnivores, and (according to Cope) even with the Lemurs. In the same way the palæontologists find transitions

Fig. 1.—Slab of Rock showing the left lateral aspect of the skeleton of *Phenacodus primævus;* from the Lower Eocene of North America: actual size of slab, 49 inches in length. (After Cope.)

between Insectivorous, Lemuroid, and Creodont types, between Perissodactyles and Proboscidea (Dinocerata and Coryphodonts), between Rodents and Ungulates (Mesotherium and Toxodon). So, too, a common base has been found for dogs and bears, for pigs and sheep, for deer and chevrotains; but it is enough for our purpose to emphasise the fact, which rapidly progressive research continually corroborates, that in early Tertiary times there persisted numerous generalised mammals which united many of the characteristics of our extant orders.

Distribution in Space.—Referring to the article on GEOGRAPHICAL DISTRIBUTION for the general results reached by the labours of Murray, Wallace, Sclater, and others, we shall content ourselves with a few illustrations showing the importance of the inquiry in regard to mammals. Perhaps the most striking of these concerns the great insular region of Australasia, where, with the exception of some bats and marine mammals which transcend the usual limits, of some rats and mice, and of forms introduced by man, the whole mammalian fauna consists of Marsupials and Monotremes. As all extant Marsupials, with the exception of the American opossums, are now Australasian, and as fossil remains of the sub-class are found as far away as Europe, we have here one of the most remarkable cases of gradual restriction and of the saving results of geological changes. For, whatever the precise details may be, there seems no doubt that geological insulation saved the Marsupial immigrants to Australia from the jaws of their pursuers.

In the Lemuroid group, again, we find 'one of the most singular phenomena in geographical distribution.' For out of a total of fifty species thirty are confined to the one island of Madagascar, the remainder occurring through tropical Africa and in restricted portions of India and the Malay Islands—facts from which it is fairly concluded that in the insulated Madagascar 'the lowly organised Lemuroids diverged into specialised forms of their own peculiar type, while on the continents they have to a great extent become exterminated, or have maintained their existence in a few cases in islands or in mountain-ranges.'

The Edentata (sloths and ant-eaters) have also a very restricted distribution in modern times, for, with the exception of the scaly ant-eaters or Manidæ (Ethiopian and oriental in range) and the African aardvark, the home of the order is in South America, where, moreover, in Pliocene times there flourished a giant race 'rivalling in bulk the rhinoceros and hippopotamus.'

Just as naturally as terrestrial mammals are absent from Oceanic islands, so the aquatic Cetaceans have a world-wide distribution, and the Sirenians almost as wide as required conditions of temperature will admit. But it must be clearly noted that when we follow in detail the distribution even of bats, whose great powers of flight free them from the limitations imposed on terrestrial mammals, we find that the inhabitants of special regions are usually marked off with perfect definiteness. The same local definiteness holds true of the world-wide (Australia always excepted) distribution of Ungulates, Rodents, and Carnivores, and is signally illustrated, for instance, in the complete absence of Insectivora from South America alone, or in the striking differences between Old and New World monkeys.

Development.—The ova, which are small and poor in yolk except in Monotremes, burst from the ovaries into the upper ends of the oviducts, may be fertilised by ascending spermatozoa, and with the above exception develop in the lower portion of the female duct known as the uterus. In the oviparous Monotremes the segmentation is partial, like that of birds and reptiles; in all the others the egg segments completely. The development proceeds in a fashion somewhat different in detail from that of the other vertebrates, but it is more important to notice that in the Placentals a close vascular connection is speedily established between the embryo and the wall of the uterus. In the hedgehog, which is a remarkably central type, this connection is first of all maintained simply by the outermost layer of the developing egg; but this is soon abetted by a union between the yolk-sac and the maternal wall, which in turn gives place to the true placenta, mainly due to the Allantois (q.v.). The final result is an interlocking of the maternal tissue with that of the fœtal membranes, and the whole life of the embryo depends on the intimacy of this interlocking, by which the blood of the mother is vitally though not directly united with that of the offspring. At birth the union is severed, and the embryonic part of the placenta, with more or less of the associated lining of the uterus, is discharged. The form and structure of the placenta vary considerably in different orders, and have furnished important aid in determining relationship. Of mammals as of other animals it is true that the individual development recapitulates, in general outline, the history of the race, for the life begins at the beginning again in a single cell, divides into a ball of cells, acquires a layered body, and passes from stage to stage presenting successively the general features of a vertebrate, of a reptilian (?), of a simple mammal, of an insectivore, and finally of a young hedgehog. Nursing remains somewhat crude in the oviparous Monotremes, which are destitute of teats, but the embryos have a considerable store of yolk which serves as preliminary capital. The eggs of the duckmole are laid in a nest, those of the Echidna seem to be borne in a temporary pouch suggesting that of Marsupials. In both cases the young lick the bare patch of skin on which the mammary glands open. The non-placental Marsupials are, in a sense, as Professor Flower says, 'the most mammalian of mammals,' since most of them carry their prematurely-born young in an external pouch surrounding the teats, whence the milk is forced into their passive mouths. In the placental mammals the young are born in a more advanced state, though still requiring much care. They are able

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to suck the mammæ actively, and their hitherto unused food-canals, gently tutored by the readily-digested milk, more or less rapidly acquire what Sollas has happily termed a 'gastric education,' which makes more substantial diet possible.

Origin of Mammals.—Though the duckmole and the Echidna lay eggs, and from the nature of their genital ducts have been termed Ornithodelphia, their affinities are rather with reptiles than with birds. For mammals and birds represent divergent branches, the common stem of which is exceedingly remote. Recognising this, the theories as to the origin of mammals are mainly concerned with the probabilities in favour of a reptilian or of an amphibian ancestry. In support of the latter it has been urged that mammals and amphibia have two skull condyles, while birds and reptiles have one; that the quadrate is small in the amphibians and mammals, large in Sauropsida; that some other parts of the mammalian skeleton (such as the pelvis) suggest affinities with amphibians rather than Sauropsida; and even that the amphibians in their varied reproductive experiments are as likely as reptiles to have originated the characteristic mammalian parturition. On the other hand, the *a priori* probabilities are in favour of the reptilian origin of mammals, for the reptiles are in general differentiation more evolved. Among the numerous extinct Saurians the Theriomorpha distinctly approach mammalia in some of their skeletal characters, the large partially-segmenting ovum of the Monotremes seems much liker that of reptiles than that of amphibians (which exhibits total segmentation), while it is not without interest that two lizards show an incipient form of yolk-sac placenta. A compromise between the rival theories has been proposed by St George Mivart, who suggests a dual origin of mammals, deriving the Monotremes from Anomodont or allied reptilian types, the Marsupials from a distinct and earlier source, perhaps amphibian. Another compromise, equally problematical, would derive mammals from a primitive stock of fingered quadrupeds, the common ancestors of amphibians and reptiles. On the whole, however, the balance of probabilities seems in favour of the origin of mammals from extinct Saurians, such as those which Cope has grouped as Theriomorpha. A few zoologists, who maintain the reptilian ancestry of mammals, and regard Cetaceans as a very primitive order, would derive these from the Ichthyopterygian reptiles; but this view has been received with virtually fatal criticism.

Evolution of Mammals.—Deeper than the problem of determining whether mammals had their origin from amphibians or reptiles is that which inquires into the factors which actually contributed to their rise. That this must have been very gradual both the fossil forms and the grades which still persist plainly show, and it is important to realise what is indeed a general truth in regard to evolution, that many of the characteristic features of mammals are not so much new acquisitions as reconstructions and elaborations of what is old. The all-important mammary glands seem to be but modifications of the sebaceous glands diffused over the skin; the placenta is chiefly composed of the allantois, which all young reptiles and birds possess; the corpus callosum, which forms a bridge between the cerebral hemispheres, is already represented in reptiles and amphibians. So, too, there is ample evidence of the very gradual evolution of special types and structures—witness the long series which connects the Eocene Eohippus, a five-fingered, three-toed ungulate, about the size of a fox, with the modern Horse (q.v.; see also FOOT); or the evolution of brains from the small casts found inside the skulls of some of the early giants to such types as are exhibited by Monotreme and Marsupial, and from these upwards to the climax in man; or the gradual growth of Antlers (q.v.) from Miocene times onwards, a history rapidly recapitulated in the life of modern stags. But after realising the gradual development of types and structures, and appreciating the influence of natural selection in determining distribution, in eliminating giants, in fostering swiftness and strength, and in justifying big brains, many naturalists still find the problem of the evolution of mammals incompletely solved. It seems necessary to follow the school of Lamarck in recognising the inheritable effects of use and effort, and the influence of a changeful environment on the progressive growth of the organism in definite directions. Furthermore, an account of the evolution of mammals has to take account of one of the most prominent characteristics, the maternal sacrifice expressed in the placental union, in the prolonged gestation (emphasised many years ago by Robert Chambers), and in the lacteal nutrition after birth, a sacrifice which must have been one of the most important factors in the progress of mammals. After a while the mammalian maternity (perhaps pathological at first and always expensive) must have paid or justified itself; but its recognition as 'a subordination of self-preserving to species-maintaining, of nutritive struggle to reproductive sacrifice,' is a necessary corrective to the prevalent theory which tends to emphasise too exclusively the competitive struggle for individual existence.

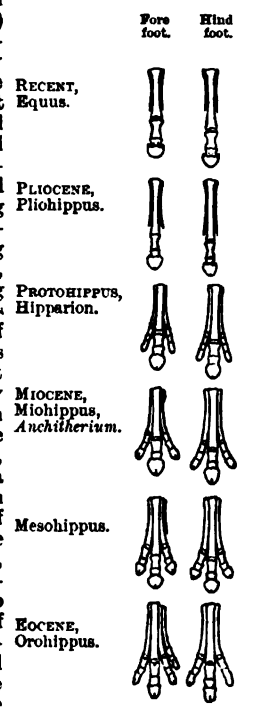

Fig. 2.—Fore and Hind Feet of the Horse and its extinct Ancestors.

Intelligence and General Life.—Through the mammalian series, from the 'frog-witted' duckmole to the highest of the Primates, there is a gradual increase in complexity of brains and quickness of wits. The remarkably docile intelligence of the dog, the cleverness of the highly-evolved elephant, the ingenuity of the social beavers, and the 'humanness' of the higher apes are crowning illustrations which become all the more remarkable when we recall the minute brains of early mammals. A contrast between those types which excel and those which lag behind will also illustrate Spencer's

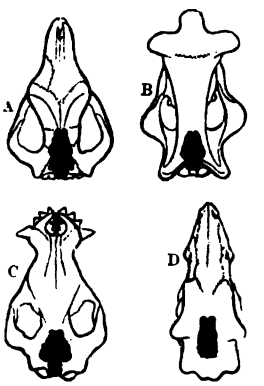

Fig. 3.—Skulls and Casts of Brains of Eocene Mammals:
A, *Tillotherium fodiens;*
B, *Brontotherium ingens;*
C, *Coryphodon hamatus;*
D, *Dinoceras mirabile.*
(After Marsh.)

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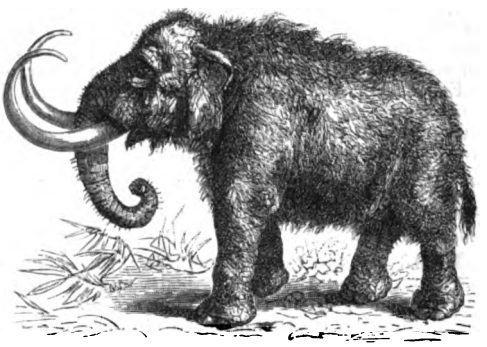
conclusion that the rate of reproduction varies inversely with the degree of individuation, for in the more highly-developed forms the number of offspring tends to diminish, while the parental care and love proportionally increase. The adaptations to diverse habits and diets, the varying length of life and the means of avoiding death, the migrations of some and the hibernations of others, the struggle for mates as well as for food, the evolution of family-life and even of social sympathies are subjects of inquiry which will well repay observation and further study of mammals.

For general works on mammals, see British Museum Catalogues (in progress); Bronn's *Thierreich—Mammalia*, by Giebel and Leche (in progress); Flower's treatise, *Ency. Brit.* (xv.); Bell's *British Quadrupeds* (2d ed. Lond. 1874); Vogt and Specht, *Nat. Hist. of Mammals* (trans. Edin. 1887); Cassell's *Nat. Hist.*, vols. i.–iii., ed. by P. Martin Duncan; *The Riverside or Standard Natural History*, vol. v., ed. by J. S. Kingsley (Lond. and New York, 1883). The last mentioned has a general bibliography. A treasury both of information and illustration is to be found in Brehm's *Thierleben* (new ed. 1890). For general structure, see the text-books of Owen, Huxley, Gegenbaur, Wiedersheim, Rolleston and Hatchett Jackson, and Flower's *Osteology of the Mammalia* (3d ed., along with Gadow, Lond. 1885). For history and evolution of mammals, see W. K. Parker, *Mammalian Descent* (Lond. 1884); O. Schmidt, *Mammalia in relation to Primeval Times* (Inter. Sc. Series, Lond. 1885); the papers of Cope and Marsh in the Reports of the U.S. Geol. Survey; Nicholson and Lydekker, *Manual of Palæontology* (Edin. 1889); the relevant works of Darwin, Wallace, Haeckel, &c.; Huxley, *Proc. Zool. Soc.* (Lond. 1880); Cope's *Origin of the Fittest* (New York, 1887). For distribution, see A. Murray, *Geogr. Dist. of Mammals* (Lond. 1866); A. R. Wallace, *Geogr. Dist. of Animals* (Lond. 1876); Heilprin (Inter. Sc. Series, Lond. 1888).

Mammary Gland. See BREAST.

Mammee Apple (*Mammea americana*), a highly-esteemed fruit of the West Indies (where it is sometimes called the *Wild Apricot*) and tropical America. It is produced by a beautiful tree of the natural order Guttiferæ, 60 to 70 feet high. The fruit is roundish, from the size of a hen's egg to that of a small melon, with a thick, leathery rind, and a very delicate inner rind adhering closely to the pulp, which must be carefully removed on account of its bitter taste. The pulp is firm and bright yellow, with a peculiar sweet and very agreeable taste, and a pleasant aromatic odour.—A similar fruit is produced by *Mammea africana*, an African species.

Mammoth, the name (originally Tartar, through the Russian) for an extinct elephant (*Elephas primigenius*), whose remains are sufficiently common in the recent deposits of northern Europe and Asia to afford a valuable supply of fossil ivory. In geological time, it is only as it were yesterday that the mammoth ceased to live, for its remains are often found along with those of man, and it seems to have persisted in Britain until after the Glacial Period. The cave-dwellers made use of its tusks, and on these too the prehistoric artists—the literal old masters—cut with no tyro hand the outlines of reindeer and various animals, including the mammoth itself. But the comparatively recent decease of this monster elephant has been repeatedly evidenced in a startling way by the discovery in Siberia of almost intact specimens, standing upright in the ice and frozen soil, with hair and skin, muscles and viscera, as well as bones, all well preserved. The first fairly complete mammoth recorded was disinterred from the ice near the mouth of the Lena in 1806; the fisherman who discovered it had overcome his awe to the extent of cutting off the tusks, wild animals had gnawed the muscles, but the hair was still on the uninjured parts of the skin, the brain in the skull, and the eyes still stared from their sockets. Others have since been disinterred, or washed out in great thaws, notably one in 1846 which was so marvellously preserved that the stomach still showed young shoots of fir and pine, and a quantity of chewed cones. Great numbers that we know



Mammoth.

nothing of must have been similarly thawed out, and their frozen corpses swept seaward to swell the accumulations of their remains found in the Arctic seas. Their disinterment after thaws explains the old Siberian opinion that the mammoths were monster burrowers, which died when they came to the surface, while the upright position in which the intact forms have been found suggests that they had been smothered where they were buried by sinking heavily into the tundra marsh. Though mammoths in complete preservation are rare, their tusks, teeth, and other bones have been found in great abundance from almost every county in England to Behring Strait, and thence into North America.

'The whole appearance of the animal,' one of the discoverers writes, 'was fearfully wild and strange. Our elephant is an awkward animal, but compared with this mammoth it is as an Arabian steed to a coarse ugly dray-horse.' It stood 13 feet high, 15 feet in length, with tusks 8 feet long; but some other specimens seem to have been larger. The dark skin was covered with yellowish to reddish soft wool about an inch long, with interspersed brownish hairs of 4 inches, and much sparser and longer black bristles. 'The giant was thus well protected against the cold.' The mammoth was liker the Indian than the African survivor, but it is only one of a crowd of fossil Proboscidea distributed in Tertiary deposits over all the great continents. Mammoth, Mastodon, and Dinotherium are the three most prominent types. Most of them were giant animals, but there seem also to have been pigmies no larger than sheep. Once numerous and widespread, the elephants are now represented only by the two modern species of restricted distribution. To this result many factors, such as the voracity of Carnivores, the deforesting of countries, the changes of climate, and the expensiveness of great bulk, have contributed. The ivory exported in large quantities from Siberia is in great part collected from the islands, some of which are almost literally heaps of mammoth bones.

See ELEPHANT; also, for facts, not inferences, H. H. Howorth's *Mammoth and the Flood* (1887); Nordenskiöld's *Voyage of the Vega*; Boyd Dawkins, in *Quart. Journ. Geol. Soc. XXXV.* (1879).

Mammoth Cave, in Kentucky, is 85 miles by rail SSW. of Louisville. The cave is about 10 miles long; but it is said to require upwards of 150 miles of travelling to explore its multitudinous

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avenues, chambers, grottoes, rivers, and cataracts. The main cave is only 4 miles long, but it is from 40 to 300 feet wide, and rises in height to 125 feet. Lucy's Dome is 300 feet high, the loftiest of the many vertical shafts that pierce through all the levels. Some avenues are covered with a continuous incrustation of the most beautiful crystals; stalactites and stalagmites abound. There are several lakes or rivers connected with Green River outside the cave, rising with the river, but subsiding more slowly, so that they are generally impassable for more than six months in the year. The largest is Echo River, three-fourths of a mile long, and in some places 200 feet wide. The air of the cave is pure and healthful; the temperature remains constant about 54°. For the fauna, see the articles referred to at CAVE, and A. S. Packard, *The Cave Fauna of North America* (Memoir of the Nat. Acad. of Science, 1888), *Inhabitants of Mammoth Cave* (1872).

Man. As the races of mankind, the structure and functions of the human body, and the higher activities most distinctive of man are discussed in special articles, it is enough here to restrict attention to three problems: (1) the human characteristics, (2) the origin or descent of man, and (3) the antiquity of the race.

(1) *Characteristics.*—Considered like any other organism, man is strictly the highest of the Primates, differing from the anthropoid apes only in degree. In adult life he is unique in his erect posture, and in the freedom of his hands from any direct share in locomotion. His body is unusually naked, his canine teeth are not longer than their neighbours, his thumbs are larger and more opposable than those of monkeys, and his feet are distinguished by the horizontal sole which rests flatly on the ground, by the projecting heel, and by the non-opposable great toe which normally lies quite parallel to the others. His face is notably more vertical than that of apes, lying below rather than in front of the forepart of the brain-case; the jaws, the orbits, and the ridges above them are relatively smaller; the nose-bones project more beyond the upper jaw; and the chin is more prominent than in other Primates. A much more momentous characteristic, however, is involved in the fact that the normal brain of an adult man is more than twice as heavy as that of the nearest monkeys, for this structural advance is an index to that intellectual and emotional development which raises even the savage many degrees above the brute, and which in its highest realisation is still full of promise. Therefore, while all naturalists allow, with Professor Owen, that there is 'an all-pervading similitude of structure' between the human body and that of the anthropoid apes, there is equal agreement that in intelligence, emotions, and controlled conduct man is pre-eminent.

But, apart from these zoological considerations, it is interesting to notice some statistical results in regard to human (and especially British) characteristics derived from the Report (1890) of the Anthropometric Committee of the British Association. Thus, the average height of man is 5 ft. 5½ in., the Polynesians leading the way with an average of 5 ft. 9·33 in., the English professional class following with 5 ft. 9·14 in., and so on, down to the Bushmen, who average 4 ft. 4·78 in. As to the adult population of Britain, in height the Scotch stand first (68·61 in.), the Irish second (67·90 in.), the English third (67·36 in.), and the Welsh last (66·66 in.), the average being 67·66 in. The Scotch are also first in weight (165·3 lb.), the Welsh second (158·3 lb.), the English third (155 lb.), and Irish fourth (154·1 lb.), the average being 158·2 lb. Again, a typical adult Englishman has a stature of 5 ft. 7½ in., a chest girth of 36½ in., a weight of 10 stone 10 lb., and is able to draw, as in drawing a bow, a weight of 77½ lb. As to the sexes (in England), the average male stature and weight is 67·36 in. and 155 lb., as against 62·65 in. and 122·8 lb. for the women. Moreover, the men are about twice as strong. For further results, many of which are of profound practical suggestiveness, the Report should be consulted.

(2) *Origin or Descent of Man.*—Even when we confine our attention to the opinions of those who accept the theory of evolution as a modal explanation of nature, we are in fairness bound to recognise some diversity of opinion in regard to the origin of man. (*a*) So unique does he appear to some that his descent from a humbler organism seems incredible—a position in favour of which some arguments will be found in the cited works of A. de Quatrefages. (*b*) Alfred Russel Wallace and others 'reject the idea of "special creation" for man, as being entirely unsupported by facts, as well as in the highest degree improbable,' yet believe that his progress from the brute was due to introduction of new causes, or 'spiritual influxes,' to which the higher human characteristics owe their origin. (*c*) The majority of naturalists deem this hypothesis of special spiritual influx inconsistent with the continuity of evolution, which they regard as a 'natural' process, self-sufficient throughout, for the origin of man as for other grand results.

The arguments which go to show that man is descended from a simpler animal are, of course, the same as those which substantiate the general theory. Thus, his structure and functions are not demonstrably different in kind from those of the nearest Primates; he develops from a fertilised egg-cell, and passes through successively higher grades of organisation in a manner which seems only interpretable as the recapitulation of ancestral history; he varies as other animals do, is subject to similar diseases, and exhibits numerous reversions and rudimentary structures which are enigmas, except on the theory that he had his origin from an ape-like stock. How his evolution was brought about is a problem requiring much elucidation, but among the special factors which conduced to evolve his higher characteristics of wisdom and gentleness it seems reasonable to attach much importance to the necessity for cunning in the struggle with stronger mammals, to the consequences of the prolonged weakness of infancy, to the influences of family life and of the indispensable combination into larger aggregates. As to the future, if we disregard minor changes—e.g. in hair and teeth, for which fashion and 'civilisation' are responsible—it seems almost certain, as Herbert Spencer has emphasised, that the progressive evolution of man must be restricted to intellectual and emotional qualities.

(3) *Antiquity of the Race.*—From the human remains, and far more frequently from the weapons, tools, and other vestiges of human activity, found in the more recent deposits on the earth's surface, it is obviously legitimate, after due caution, to infer the presence of man at the time—certainly not estimable in the years of any chronological system—when these beds were formed. Cuvier and others tried, indeed, to avoid this conclusion—for instance, by exaggerating the power of floods in mixing up recent deposits; while Boucher de Perthes, who in 1836 discovered flint axes along with mammoth bones in undisturbed strata 20–30 feet below the surface, had to wait almost twenty years for a fair hearing, and yet longer for decisive corroboration. Both were gained, however, and the conversion of naturalists may be dated from 1863, when Lyell summarised the existing evidence in his *Antiquity of Man.* Since then the problem has been worked at with ever-increasing energy

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and success, and there is now general agreement that man was alive during the later stages of the glacial epoch, while there are indications of his presence in Pliocene and, according to a few, even in Miocene ages (see GEOLOGY).

Older, however, than any indications of his Pliocene presence man must surely be, for zoologists refer his origin not to any of the existing anthropoid apes, as is sometimes popularly supposed, but to the common stock which included their ancestors and his, and which had apparently begun to diverge in Upper Miocene times. In a similar way, our impression of the antiquity of man is increased when we remember that the most ancient human remains, such as the Neanderthal skull, do not take us appreciably nearer any low type of man such as the ancestral forms presumably exhibited. Moreover, the oldest distinct implements and artistic products suggest not the handicraft of beginners, but the work of men behind whom there already lay a long history.

For further discussion of man in various aspects, see the articles on the various continents, countries, and races, as well as the following articles, with the other articles and works cited under them :

Adam.	Creation.	Longevity.
Agriculture.	Ethics.	Marriage.
Anatomy.	Ethnology.	Mythology.
Animal.	Evolution.	Negro.
Anthropology.	Family.	Philology.
Archæology.	Folklore.	Religion.
Art.	Government.	Sex.
Biology.	Life.	Totemism.

Also Darwin, *The Descent of Man* (1871); Dawkins, *Cave-Hunting* (1874), *Early Man in Britain* (1880); A. Geikie, *The Great Ice Age* (1877), *Prehistoric Europe* (1881); Haeckel, *Anthropogenie* (2d ed. 1874; Eng. trans. 1879); Hartmann, *Anthropoid Apes* (Inter. Sc. Series, 1885); Huxley, *Man's Place in Nature* (1863); Lyell, *Geological Evidences of the Antiquity of Man* (1863); St George Mivart, *Man and Apes* (1874); Peschel, *Races of Man* (trans. 1876); Caspari, *Urgeschichte der Menschheit* (2d ed. 1877); Mortillet, *Le Préhistorique Antiquité de l'Homme* (1885); Quatrefages, *L'Espèce Humaine* (1861), *Histoire Générale des Races Humaines* (1887); J. Ranke, *Der Mensch* (1886); Topinard, *Éléments d'Anthropologie Générale* (1885); A. R. Wallace, *Darwinism* (1889); Wiedersheim, *Der Bau des Menschen* (1887); C. Vogt, *Vorlesungen über den Menschen* (1864; trans. 1864); and Tylor's works.

Man, ISLE OF, is situated in the Irish Sea, 16 miles S. of Burrow Head in Wigtownshire, 27 miles SW. of St Bees Head, and 27 E. of Strangford Lough. The length of the island is 33¼ miles, breadth 12½ miles, and area 145,325 acres (227 sq. m.), of which nearly 100,000 are cultivated. At the south-western extremity is an islet called the Calf of Man, containing 800 acres, a large portion of which is under cultivation. A chain of mountains extends from north-east to south-west, the highest of which is Snaefell (2024 feet). In some of the streams trout abound, though in many the fish have been destroyed by the washings from the lead-mines. The coast-scenery from Maughold Head on the east, passing south to Peel on the west, is bold and picturesque, especially in the neighbourhood of the Calf, where Spanish Head, the southern extremity of the island, presents a sea-front of extreme grandeur.

The greater part of the island consists of clay-slate under various modifications. Through the clay-schist granite has burst in two localities, in the vicinity of which mineral veins have been discovered, and are extensively worked. Nearly 5000 tons of lead are extracted annually, considerable quantities of zinc, and smaller quantities of copper and iron; the lead ore is very rich in quality. The principal mines are at Laxey on the east coast, and Foxdale near the west. The Great Laxey Mine is one of the most important in the United Kingdom.

The climate is remarkable for the limited range of temperature, both annual and diurnal; westerly and south-westerly winds greatly predominate, easterly and north-easterly winds occurring chiefly in the autumn quarter. Myrtles, fuchsias, and other tender exotics flourish throughout the year. The flora of the island is almost identical with that of Cumberland. The Manx cat is tailless (see CAT).

The fisheries afford employment to nearly 4000 men and boys. More than 700 boats are employed in the herring and cod fisheries, the average annual produce being above £60,000. Large numbers of fat cattle are shipped to the English markets, as well as about 20,000 quarters of wheat annually. The manufactures are inconsiderable. The revenue derived from the island amounts to about £50,000 per annum; of this the greater part is received from customs duties, and the whole, except £10,000 a year payable to the imperial treasury, is used for insular purposes.

The Isle of Man possesses much to interest the antiquary. Castle Rushen (see CASTLETOWN), probably the most perfect building of its date extant, was founded by Guthred, son of King Orry, in 947. The ruins of Rushen Abbey (1154) are picturesquely situated at Ballasalla. Peel Castle, with the cathedral of St German, is a very beautiful ruin, dating from the 12th century (see PEEL). There are numerous so-called Druidical remains and Runic monuments throughout the island; the Runic crosses, of which there are some forty in all, are especially numerous at Kirk Michael. The Tynwald Hill at St John's, near the centre of the island, is a perfect relic of Scandinavian antiquity. Once a year new Acts of Tynwald are here proclaimed. The hill is artificial, circular, and arranged in four platforms. Both institution and use should be compared with the Icelandic Tingvalla. The island is divided into six *sheadings;* these into seventeen parishes; these, again, were divided into *treens* (now obsolete), and, lastly, into *quarter-lands.* The towns, noticed separately, are Castletown, Douglas, the modern capital, Peel, and Ramsey.

The principal line of communication with the United Kingdom is between Douglas and Liverpool, by means of a fine fleet of swift steamers. There is a submarine telegraphic cable between Maughold Head and St Bees Head. In 1873 a line of railway was opened between Douglas and Peel; in 1874 to Castletown and the south; and in 1879 to Ramsey—all on the single narrow-gauge system. Extensive improvements in the way of harbour-works, piers, and promenades have been carried out at Douglas, Ramsey, and Peel. Pop. (1821) 40,081; (1841) 47,986; (1871) 54,042; (1881) 54,089; the smallness of the increase being attributable to emigration. Visitors number about 130,000 annually.

The Roman *Mona* was not Man, but Anglesey. Previous to the 6th century the history of the Isle of Man is involved in obscurity; from that period it was ruled by a line of Welsh kings, until near the end of the 9th century, when the Norwegian, Harald Haarfager, invaded and took possession of the island. A line of Scandinavian kings succeeded, until Magnus, king of Norway, ceded his right in the island and the Hebrides to Alexander III. of Scotland (1266); this transference of claim being the direct result of the disastrous failure of the expedition of Haco of Norway against the Scots in 1263. On Alexander's death the Manx placed themselves under the protection of Edward I. of England by a formal instrument dated 1290; on the strength of this document the kings of England granted the island to various royal favourites from time

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to time until 1406, when it was granted to Sir John Stanley in perpetuity, to be held of the crown of England, by rendering to the king, his heirs, and successors, a cast of falcons at their coronation. The Stanley family continued to rule the island under the title of Kings of Man, until 1651, when the style of Lord was adopted. In the same year the island was surrendered to a parliamentary force by Receiver-general Christian, who had raised an armed body against the government, then in the hands of the Countess of Derby. Parliament granted the island to Lord Fairfax; but on the Restoration the Derby family were again put in possession. On the death of James, tenth Earl of Derby, without issue in 1735, James, second Duke of Athol, descended from the youngest daughter of James, seventh Earl of Derby, became Lord of Man. The Isle of Man having been for a long period the seat of an extensive smuggling trade, to the detriment of the imperial revenue, the sovereignty of it was purchased by the British government, in 1765, for £70,000 and an annuity of £2000 a year, the duke still retaining certain manorial rights, church patronage, &c. The last remaining interest of the Athol family in the island was transferred to the British crown in 1829; the amount paid for the island having amounted in the aggregate to £493,000.

The Isle of Man forms a separate bishopric under the title of Sodor and Man. The bishopric of the Sudoreys—Scandinavian for 'Southern Isles'—was for a time annexed to Man; hence the title of Sodor, which is still retained, the name having been applied to the islet of Holm Peel, on which the cathedral church of the diocese stands. This bishopric is said to have been founded by St Patrick in 447. Among the bishops the most famous was Thomas Wilson (q.v.), the author of *Sacra Privata*. The Manx Church has its own canons, and an independent convocation. The see is, for certain purposes, attached to the province of York; the bishop sits in the House of Lords, but does not vote.

The Isle of Man has a constitution and government of its own, to a certain extent independent of the imperial parliament. It has its own laws, law-officers, and courts of law. The legislative body is styled the Court of Tynwald, consisting of the Lieutenant-governor and Council—the latter being composed of the bishop, attorney-general, two deemsters (or judges), clerk of the rolls, water bailiff, archdeacon, and vicar-general—and the House of twenty-four Keys, or representatives. A bill is separately considered by both branches, and on being passed by them is transmitted for the royal assent; it does not, however, become law until it is promulgated in the English and Manx languages on the Tynwald Hill. The House of Keys was formerly self-elective; but in 1866 an act was passed establishing an election by the people every seven years; and a bill passed in 1880 to amend this act abolished the property qualification for members, granted household suffrage in towns, £4 owner and £6 tenant franchise in the country, and conferred the suffrage on women. The armorial bearings of Man are three legs in armour conjoined at the thighs. The Manx people are of Celtic origin, with a strong dash of the Scandinavian. The language belongs to the Goidelic group of the Celtic languages (see CELTS). It is now but little spoken. Church service in the Manx language has been discontinued since the middle of the 19th century. There is no literature beyond a few songs and carols. The Prayer-book was translated into Manx in 1765, the Bible in 1772. A dictionary was compiled in 1835. Some account of the native superstitions will be found in the notes to *Peveril of the Peak*.

Down to the middle of the 19th century the island was almost exempt from taxation, and consequently looked upon as a cheap place of residence, while its laws were available for the protection of English debtors. All this has long ceased. Taxation, locally imposed, has been introduced for various purposes; and, though there is no poor-law, rates in aid are not unknown. The influx of visitors, and the facilities for exporting native produce, have equalised prices with those obtaining in the surrounding countries, and the social condition has been much modified.

See *The Isle of Man, its History*, &c., by the Rev. J. G. Cumming, M.A., F.G.S.; *History of the Isle of Man*, by Joseph Train, F.S.A. Scot.; Brown's *Popular Guide*; *Chronica Regum Mannia*, edited by Munch (Christiania, 1860); *Surnames and Place Names of the Isle of Man*, by A. W. Moore, preface by Prof. Rhys (1890); and the works published by the Manx Society (19 vols. 1858–68).

Manaar', GULF OF, lies between Ceylon and the Madras coast, and is closed on the north by a low reef of rocks and islands called Adam's Bridge. Its extreme width is nearly 200 miles. The gulf is famous for its pearl-fisheries.

Manacor', a town of Majorca, in a fertile plain, 30 miles E. of Palma by rail. Pop. 14,929.

Mana'gua, the capital of Nicaragua, lies in a fertile district, on the south shore of Lake Managua, 53 miles by rail SE. of Leon, and has perhaps 10,000 inhabitants. For the lake, see LEON.

Manakin, a name applied to various birds of the South American group of Chatterers, amongst others to the Cock of the Rock (q.v.). See also COTINGA.

Manáos, capital of Amazonas province, in the United States of Brazil, is on the Rio Negro, 12 miles above its confluence with the Amazons. An ugly, whitewashed cathedral rises in the centre of the town, which also boasts a custom-house, a tiny fort, and a military hospital. It is a steamboat station, and has a considerable trade in various forest-products, but principally in india-rubber. The population, though often stated at 25,000 to 30,000, is under 12,000.

Manassas, formerly MANASSAS JUNCTION, a village close to Bull Run (q.v.). The Confederates called their two victories here the first and second battles of Manassas.

Manasseh, the name of the eldest son of Joseph. The tribe of Manasseh received land on both sides of the Jordan (see PALESTINE).—MANASSEH was also the name of one of the kings of Judah (the fourteenth), who succeeded his father Hezekiah, 697 or 699 B.C., at the age of twelve, and reigned, according to the narrative, for fifty-five years. He rushed headlong into all manner of idolatry, and seduced the people to follow his example. Carried prisoner to Babylon, he repented, and his prayer was heard (2 Chron. xxxiii.).—The apocryphal composition called the *Prayer of Manasses*, found in some MSS. of the Septuagint, was never positively received as canonical.

Manasseh ben Israel, Jewish scholar, was born at Lisbon in 1604, fled with his father from the Inquisition, and settling at Amsterdam became chief rabbi of the synagogue there. In 1656 he visited England, seeking to secure (see JEWS, Vol. VI. p. 328) from Cromwell the readmission of the Jews. He died at Middelburg in 1659. He published texts of various parts of the Old Testament, with notes; *De Creatione Problemata XXX.* (1635); *De la Resurreccion de los Muertes* (1636); *De Termino Vitæ* (1639); *Esperança de Israel* (1650); *Vindiciæ Judæorum, or a Letter in Answer to Questions propounded* (Lond. 1656); and *Humble Address to the Lord Protector on behalf of the Jewish Nation* (1656).

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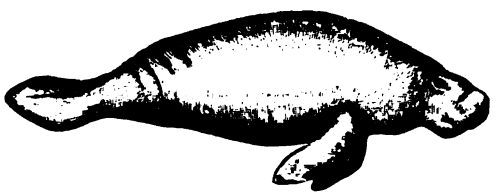
Manatee (*Manatus*), one of the 'sea-cows' or Sirenia, allied to the Dugong (q.v.) and to the extinct Rhytina. Two species, very like one another in structure and habit, are distinguished, *M. australis*, in the rivers and estuaries of the Atlantic side of tropical South America, and *M. senegalensis*, in the Senegal and other rivers of West Africa. They are gregarious, inoffensive, sluggish mammals, browsing on algæ, fresh-water weeds, and even shore-plants. In regard to their breeding and parturition information is still required, but we know that the mothers show much affection for the young, and protect them in danger. In length the manatee measures from 10 to 12 feet; the colour of the thick, wrinkled, hairless hide is dark bluish gray, lighter as usual on the ventral surface. The upper lip bears a rounded knob, and



Manatee.

there are yellow bristles about the mouth; the eyes are small and deeply sunk, and the nostrils are valved slits at the end of the snout. From the dugongs they differ in having a thicker body and a straighter head, with the jaws but slightly curved, in the rounded or shovel-like shape of the tail, and in the presence of rudimentary nails on the fore-limbs, to the hand-like form of which the word Manatee refers. They differ also in more technical characters—e.g. in the very exceptional occurrence of six instead of seven neck vertebræ, and in the Dentition (q.v.), which in the adult manatee is represented by horny pads replacing the front teeth lost in early life, and by ∔∔ ridged molars, of which, however, only ∔ are in use at a time. The manatee, though becoming scarcer, is still harpooned or otherwise caught, being valued on account of its palatable flesh, its abundant fat, and its strong skin. Gentle and affectionate, it readily admits of being tamed, and living specimens have been successfully transported to the Zoo in London.

See DUGONG; and also the memoirs by Murie and Garrod in the *Trans. Zool. Soc.*, vols. viii. x. xi.

Manbhum, a district forming the eastern part of Chota Nagpore (q.v.).

Manby, GEORGE WILLIAM, inventor of life-saving apparatus for shipwrecked persons, was born in 1765, at Hilgay, near Downham Market in Norfolk, served in the militia, and became barrack-master at Yarmouth in 1803. In 1808 he succeeded, with apparatus designed by him, in saving the lives of the crew of the brig *Elizabeth*. A career of usefulness was thus commenced, which he followed for the remaining forty-six years of his life. He repeatedly received grants of money from parliament. He died November 18, 1854. It was estimated that, by the time of his death, nearly 1000 persons had been rescued from stranded ships by means of his apparatus. See LIFE-SAVING APPARATUS.

Mancha, LA, a district of Spain, the southernmost part of the old kingdom of New Castile, comprising most of the present province of Ciudad Real, with parts of Albacete, Toledo, and Cuenca (see CASTILE). It is the country of the ever-memorable Don Quixote, his squire Sancho Panza, and of the peerless Dulcinea del Toboso.

Manche ('sleeve'), a maritime department in the north-west of France, formed from the old province of Normandy, derives its name from La Manche (the English Channel), which washes its rocky coasts. Greatest length, 81 miles; average breadth, 28 miles; area, 2289 sq. m. Pop. (1872) 544,776; (1886) 520,865. The climate is mild but humid. Cereals, flax, hemp, beetroot, and fruits are extensively cultivated. Immense quantities of apples are grown, from which 28,000,000 gallons of cider are made annually. Horses of the true Norman breed are reared, and excellent cattle and sheep are fed on the extensive pastures. There are valuable granite quarries. The department is divided into the six arrondissements of St Lô, Coutances, Valognes, Cherbourg, Avranches, and Mortain. Capital, St Lô. The port of Cherbourg and the rock of St Michel (with its celebrated abbey) belong to this department.

Manchester (Sax. *Mamcestre*), a corporate and parliamentary borough of Lancashire, was elevated to the dignity of a city in 1847, by being made the see of a bishop, and confirmed by royal charter in 1853. It is situated in the hundred of Salford, on the east bank of the Irwell. Salford is on the opposite bank; and the two boroughs, connected by sixteen bridges (besides railway viaducts), may be considered one city. Manchester is the acknowledged centre of the most extensive manufacturing district in the world, and is remarkable from being surrounded by a ring of populous suburban townships formed from the overflow of its population. Within a few miles there is a second circle of towns, with populations ranging from 10,000 to 50,000. At a radius of 30 miles is another cluster of towns, nearly all of them manufacturing, and to all of which there is easy and frequent access by tramways, canals, and railways. Manchester is 187 miles NNW. of London, 31 E. of Liverpool, 51¼ SE. of Lancaster, 84 N. of Birmingham, 68½ NW. of York, 48¼ SW. of Leeds, 41¼ NW. of Sheffield, and 40 NE. of Chester. The growth of the population of the two boroughs is shown in the following table:

	Manchester.	Salford.	Total.
1801.....	75,275	14,477	89,752
1851.....	303,382	102,449	405,831
1871.....	351,189	124,801	475,990
1881.....	422,801	176,235	600,036

By the City Extension Act of 1885 the parliamentary boundaries were greatly extended, and later an agitation was begun in various suburban townships for incorporation. Five of these were already incorporated with Manchester in 1890, when others were applying and expected to become incorporated. The total population then will probably exceed a million, though officially it was estimated in 1890 at 873,000. The area of the parliamentary borough is 20 sq. m., and that of Salford 8 sq. m. Both boroughs were enfranchised by the Reform Bill of 1832, Manchester returning two members and Salford one member to parliament. The Reform Bill of 1867 gave Manchester three and Salford two members. Since 1885 Manchester returns six and Salford three members to parliament.

At present Manchester and Salford, and a large portion of the suburban population, are supplied with water collected on the slopes of Blackstone Edge, distant about 20 miles. The water-works possess a total capacity of 3,828,000,000 gallons, and the average daily supply is about 25,000,000 gallons. In view of the rapid increase of the population the city council purchased Thirlmere Lake, in Cumberland, from which will come a further supply of 50,000,000 gallons daily. The water will be conveyed by means of an aqueduct and tunnels to Bolton, and the remaining 60

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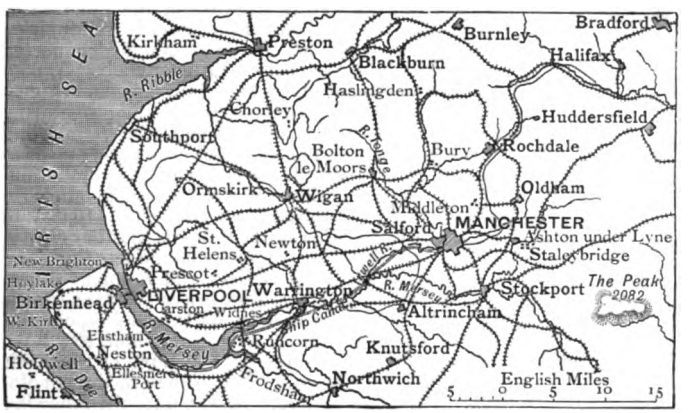
miles in large iron pipes laid along the main roads. The first contract of 6 miles' tunnelling and 1½ mile of open cutting was let in 1885. The water-works, along with the gas-works, are the property of the corporation, and Manchester claims to have been the first local authority to obtain powers to supply public light. The profits average £105,480, out of which £25,000 is paid over for city improvements. The market rents amount to £44,000 per annum, and until so late as 1845, being governed by the antiquated machinery of manor courts, borough reeve, constables, and unpaid magistrates, tax and toll were paid on all articles brought into the markets. During that year (1845) these manorial privileges were bought for £200,000. In 1845–46 a public subscription founded three parks of about 30 acres each, and shortly after a fourth of 60 acres was added. There are now in Manchester and Salford eleven parks, giving seven for the former and four for the latter, with eight recreation grounds, covering altogether 300 acres. Manchester was also the first borough to take advantage in 1852 of the



Free Libraries Act. Perhaps none of the great towns in Britain is better furnished with good libraries and reading-rooms than Manchester, all provided within a few years. There are six branch libraries with reading-rooms, and also additional rooms for boys. The Free Reference Library in King Street has 198,000 volumes. Salford has four branch libraries, with reading-rooms and a museum; while Manchester in 1890 received a park, library, and museum from the Whitworth legatees, to be incorporated with the Technical School and School of Art. There are besides eighteen private libraries, some of which are connected with institutions of various kinds. The Chetham Library, founded by Humphrey Chetham (q.v.) in 1653, contains 30,000 volumes, with many rare and curious books and manuscripts, and was the first free library in England. There is a fine old reading-room, in which the visitor is at once carried back in imagination to medieval times. Mention may be made also of the Athenæum, Royal Exchange, Portico, and Law and Foreign Libraries, &c. The two boroughs have about 162 churches belonging to the Establishment. The Cathedral, formerly known as the 'Old Church' (built in 1422), is a fine Gothic structure, and between 1845 and 1868 underwent complete restoration in its original style. It comprises a perfect stalled choir of exquisite beauty, a retrochoir, lady chapel, lateral chapels, chapter-house, and a tower 139 feet high, with ten bells. There are 23 Roman Catholic and 398 dissenting chapels, some of which are very fine specimens of modern Gothic architecture. There are 5 Jewish synagogues, 5 German churches, a Greek church, and an Armenian (q.v.) church.

The principal buildings for secular purposes are, first, the town-hall (1868–77), by Waterhouse, completed in 1883. The original estimate for the building was £750,000; it has, however, cost £1,053,000, and occupies an area of 8648 square yards. It is a Gothic structure and triangular in form, built of brick, faced with freestone, and at some parts with granite; and is, it is claimed, the finest building in the world devoted to purely municipal purposes. The great hall is decorated with remarkable pictures illustrating the history of Manchester, by Madox Brown (q.v.). The clock-tower, 286 feet high, contains a fine peal of twenty-one bells. In the Royal Infirmary, first used in 1755, as many as 32,000 patients are treated annually, and there is an average of 25 accident cases admitted daily. The Royal Institution is a noble Doric edifice by Barry, built at a cost of £30,000, and contains a gallery of paintings, a school of design, and a lecture theatre. It was erected in 1825–30, its object being to diffuse a taste for the fine arts by exhibiting works of art of the highest class, and to encourage literary and scientific pursuits by means of popular courses of lectures. The walls of the entrance-hall are decorated with casts of the Elgin Marbles, presented by George IV. A fine statue of Dalton by Chantrey is placed in the hall. The Royal Exchange (1864–74), an imposing building in the Italian style, has a meeting-hall said to be the largest in the United Kingdom—area, 5170 square yards. It is 120 feet wide without intermediate supports. Tuesdays and Fridays are the chief days for business, and on these days its immense area is densely covered. The Free-trade Hall (1856) holds 5000 people, and is a memorial of the agitation which resulted in the repeal of the corn laws. The 'Peterloo Massacre' took place on its site. The Assize Courts (1864), by Waterhouse, are a splendid specimen of Gothic architecture, and cost £100,000. The great hall is a magnificent apartment, being 100 feet long, 48½ broad, and 75 feet high. All the arrangements of the court are considered as nearly perfect as possible.

The Literary and Philosophical Society (1789), in George Street, has a valuable scientific library and a chemical laboratory, and publishes memoirs. On its roll are many distinguished names, including Drs Henry and Percival, Benjamin Franklin, Thomas de Quincey, John Dalton, Eaton Hodgkinson, Sir W. Fairbairn, Sir James Whitworth, James Nasmyth, and Dr Joule. There are about seventy other societies and institutions of various kinds in Manchester, many of them of very high standing.

The statues and monuments in Manchester are numerous, and vary considerably in order of merit. On the Infirmary Esplanade are four statues—the Duke of Wellington, Sir R. Peel, Watt, and Dalton. The Albert Memorial stands in Albert Square, also a statue of Bishop Fraser, and in 1890 it was proposed to erect one of Dr Joule, and another of John Bright. A bronze statue of Cobden is placed in St Anne's Square, Humphrey Chetham in the Cathedral, and Cromwell near the entrance of Victoria Street.

The facilities for education in Manchester have been greatly extended and improved within recent years. The Grammar-school is the most ancient, and

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was founded by Hugh Oldham, Bishop of Exeter, in 1515. Its original endowment was £29 per annum, but the possession of certain mills on the Irk—a tributary of the Irwell—soon gave the school a substantial revenue. In 1825 the report of the Charity Commissioners showed that the total income of the Grammar-school Trust had reached a sum exceeding £4000 per annum. In 1868 the original plan of the founder was altered, and the new scheme, as sanctioned by the Court of Chancery, is the admission of 100 boys at twelve guineas a year each, the remainder being on the foundation, and the school is enlarged to accommodate 350 boys. In Brazenose College, Oxford, there are four scholarships belonging to this school, and eighteen others of which it has every third turn. In St John's College, Cambridge, it has, in turn with two other schools, a right to twenty-two scholarships. There is also a hospital school, founded in 1651 by Humphrey Chetham, 'for maintaining, educating, bringing up, and apprenticing forty healthy and poor boys.' By 1845 the revenue had increased sufficiently to justify the feoffers in increasing the number of boys to 100. In 1851 was opened Owens College (q.v.). It is due to the liberality of John Owens, who died in 1846, leaving by will £100,000 to be expended in founding an educational institution of the highest class. In 1870 a further sum of £90,000 was expended on new buildings, &c. In 1880 a royal charter was granted for the founding of Victoria University, of which Owens is one of the colleges, and by an additional charter the university was entitled to confer degrees in surgery and medicine. As an educational institution it has already earned a very high character, and has grown steadily in usefulness and resources. The university contains an excellent library and museum of natural history. The Technical School, with which in 1883 was incorporated the Mechanics' Institute, and in 1890 the Manchester Whitworth Institute, has proved very completely how a school can be organised to give thorough technical training in the principles and processes of great and complicated industries. The course of studies is generally confined to subjects of commercial and mechanical interest—theoretical and practical engineering, designing, spinning and weaving, printing, dyeing, and bleaching, metallurgy and chemistry. It has also several good lecture-rooms. Every facility is afforded the scholars for acquiring thorough knowledge, theoretical and practical, of the various handicrafts, and the expert use of tools. The guarantors of the Manchester Exhibition (1887) have contributed their surplus of £42,000, and the city council has adopted the Technical Instruction Act, and has from 1890 allotted the school the sum of £2000 per annum. In 1889–90 there were 50 board schools and 130 elementary schools, with an attendance of 72,167 scholars. There are evening classes in connection with the board and technical schools at a moderate rate. As regards the education of the poorer children, the persevering endeavours of the wealthy and benevolent in this direction have been very noteworthy.

The great revolution in the industrial life of England began here about the middle of the 18th century—the substitution of the factory system, where large numbers of men work together, for the older method of each working in their homes. New possibilities were also opened up by a series of remarkable inventions which increased production of manufactured goods at a far cheaper and inconceivably more rapid rate, combined with the new application of mechanical power to the service of man in Watt's steam-engine. Manchester has been the pioneer in opening up new means of internal communication, and to meet the rapid increase of trade and commerce many efforts were made in early times to substitute some better means for the pack-horse mode of carriage and conveyance. In 1720 the Irwell was made navigable. In 1756 the Bridgewater Canal was constructed, which put Manchester in communication with the coalfields of Lancashire and the salt-mines of Cheshire, and made an outlet to the sea. Later it became a highway for passengers as well as goods. In 1830 Manchester had the first perfect railway in full operation. It has been proved that conveyance by water is only one-tenth of the cost of the same distance by land, and, in order to avoid transhipment of goods, and to render Manchester an inland seaport, the gigantic engineering work of making a ship-canal at a cost of £5,750,000 sterling was carried out in 1887–91 (see CANAL, Vol. II. p. 700). A perfect network of railways and canals radiates from Manchester as a centre in all directions. In consequence of all these gradual changes Manchester is losing its character as merely a manufacturing town. A change is gradually developing in the *locale* of the various large industries, and the city may be regarded now as the general market for the whole trade. The principal cotton-mills and other industries are being removed to the suburbs north and east of the city, and in and around Manchester and Salford two-thirds of the entire cotton-manufactures of the United Kingdom are located. There are about 700 different industries in the district. Manchester was the first place to secure the privilege of inland bonding for articles charged with customs duties, and now produces a large and increasing revenue from that source.

The sanitary condition of Manchester is not a satisfactory one, and in consequence the death-rate, averaging 35 per 1000, is abnormally high; but it must be remembered that the corporation had long arrears of neglect and indifference to make up, while a rapid increase of population was going on. Down to 1838 Manchester and Salford were governed by a borough-reeve and constables, and from their abolition only could the real work of improvement begin. As instances of the immense works accomplished by the corporations may be mentioned the gas and water supplies, municipal buildings, widening and draining of the streets, removal of unhealthy courts and dwellings. The sewage main drains made since 1838 are 95 miles in length, cross drains and eyes 148 miles, whilst the area of streets paved equals a million square yards. The smoke nuisance is perhaps more difficult to remove now than when the factories were within the city. The disease and death dealing river, the Irwell, flowing through a dense population, has yet to be dealt with. Besides the pollution from public works of all kinds it is the receptacle of the sewage from more than one million of a population distributed over the watershed of the Irwell, comprising an area of 300 sq. m. Great efforts are constantly being made to remedy this unfortunate state of matters.

Manchester is undoubtedly an ancient city. It is mentioned as a Roman station (*Mancunium*; in A.S. *Manigceaster*), and spoken of at the time of the Norman Conquest in connection with Salford and Rochdale, but the uncertainty of all trustworthy information, especially as regards its origin, renders any account of its early history a matter of doubtful value. We cannot determine when Manchester became a manufacturing district, but it is probable that the introduction of Flemish artificers in the reign of Edward III. is the real starting-point. In the 13th century there was a fulling-mill, and dyeing yarns or cloth was practised. The 14th and 15th centuries are mentioned as periods of great progress. Camden, who visited Manchester in the reign of Queen Elizabeth, describes it as

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'surpassing neighbouring towns in elegance and populousness. Here,' he says, 'is a woollen manufacture, church, market, and college. In the last age it was more famous for the manufacture of stuffs called Manchester cottons and the privilege of sanctuary, which the parliament under Henry VIII. removed to Chester.' In 1724 Dr Stukely describes it as 'the largest, most rich, populous, and busy village in England. Here are about 2400 families, and their trade, which is incredibly large, consists of fustians, tickings, girth-webbs, and tapes, which are dispensed all over the kingdom and to foreign parts. They have looms which work 24 laces at a time, stolen from the Dutch, and on the same river for the space of 3 miles there are 60 water-mills.' Another authority of near the same date says 'the inhabitants are not only thrifty and inventive but very industrious and saving—always contriving and inventing something new.'

In the political world Manchester has taken a leading place. The Anti-corn-law League, which after a seven years' struggle caused the repeal of the corn laws, had its origin here; and the *Manchester School* is a term applied to a party of English Radicals, which had its origin in the Anti-corn-law League. It identified itself with the development of free-trade principles, utilitarianism, the resistance to government interference (as with factory labour), supporting a policy of *laissez faire*, and in foreign affairs was a peace party, insisting strongly on non-interference. See articles on Corn Laws, Free Trade, Bright, Cobden, Gibson (Milner).

See Whittaker's *History of Manchester* (1771); Prentice's *History and Sketches of Manchester* (1850–53); Reilly's *History of Manchester* (1861); Baine's *History of Lancashire* (1870); Proctor's *Memorials of Manchester* (1880); Axon's *Annals of Manchester* (1886); Saintsbury's *Manchester* (1887); and M'Culloch's *Dictionary of Commerce* (1887).

Manchester, the largest city of New Hampshire, stands mostly on the east bank of the Merrimac River, 16 miles S. of Concord, 59 miles NNW. of Boston by rail. Its principal streets are wide and shaded with elms, and it has several public parks. The river here falls 54 feet, and affords water-power to numerous factories. The great industry of the place is its manufacture of cottons and woollens; but locomotives, fire-engines, sewing-machines, wagons, edged tools, boots and shoes, paper, &c. are also manufactured. Manchester is the seat of a Roman Catholic bishop, and has a Catholic orphanage and a convent, besides a state reform-school. Pop. (1870) 23,536; (1880) 32,630.

Manchester, EDWARD MONTAGU, second EARL OF, English general and statesman, was the son of the first earl, and was born in 1602. After leaving Cambridge—his college was Sidney Sussex—he accompanied Prince Charles to Spain, and afterwards sat in the House of Lords as Baron Kimbolton. But siding with the popular party, and being an acknowledged leader of the Puritans in the Upper House, he was charged by the king (3d January 1642) with entertaining traitorous designs, along with the five independent members of the House of Commons. He succeeded his father as earl in the same year. On the outbreak of hostilities he of course fought for the parliament. He served under Essex at Edgehill, then held the associated (eastern) counties against Newcastle, took Lincoln (1644), and routed Prince Rupert at Marston Moor—that is to say, he nominally commanded; the real fighting was done by Cromwell and his Ironsides. He then marched to oppose the royalists in the south-west, and defeated them at Newbury (the second battle). But after this battle he again showed slackness in following up the victory, the same fault that had been noticed after Marston Moor. In consequence Cromwell accused him of military incompetency in the House of Commons, and the two had a downright quarrel. The Self-denying Ordinance deprived Manchester of his command, and this did not allay his bitterness against Cromwell. He opposed the trial of the king, and protested against the Commonwealth. Afterwards, having been active in promoting the Restoration, he was made Lord Chamberlain, a step designed to conciliate the Presbyterians. He died 5th May 1671.

His grandson, CHARLES MONTAGU, fourth EARL, supported William of Orange in Ireland, was sent as ambassador extraordinary to Venice (1696), Paris (1699), and Vienna (1707), and was made Duke of Manchester in 1719 for having favoured the Hanoverian succession. He died 20th January 1722.

Manchineel (*Hippomane mancinella*), a tropical American tree of the natural order Euphorbiaceæ, celebrated for the poisonous properties of the acrid milky juice with which every part of it abounds. A drop of this juice, which is of a pure white colour, burns like fire if it falls upon the skin, and the sore which it produces is very difficult to heal. The Indians of tropical America use it for poisoning their arrows. The fruit is in form, colour, and scent not unlike a small apple. The fruit of manchineel dried and pulverised is diuretic; the seeds are excessively so. The wood is of fine quality, and well suited for cabinet-making.

Manchuria, or the country of the Manchus, called by the Chinese Tung-san-sheng, is the north-easternmost division of the Chinese empire, bounded N. by the river Amur; E. by the Usuri and the Russian Maritime Province; S. by Corea, the Yellow Sea, and the gulf of Liao-Tung; and W. by Mongolia. It embraces three provinces—Moukden (area, 50,000 sq. m.; pop. 12,000,000), in the south, also called Feng-tien and Liao-Tung; Heilung-chiang (area, 140,000 sq. m.; pop. 2,000,000), in the north; and Kirin (area, 90,000 sq. m.; pop. 7,000,000), lying between the other two—total area, 280,000 sq. m.; total pop. 21,000,000. The eastern and most of the central parts are covered with the irregularly-grouped ranges of the Long White Mountains, which in the White Mountain itself reach 8000 feet, whilst the northern province is crossed by the Chingan Mountains. The central parts of the country are watered by the Sungari, which rises in the crater-lake of the Long White Mountains, and after a course of 850 miles joins the Amur in the north of Kirin province. Besides the frontier rivers already mentioned there are the Nonni and the Hurka, affluents of the Sungari; the Tumen, which separates the Maritime Province of Russia from Corea; and the Ya-lu and Liao-Ho, which flow south-westwards into the China Sea. The hills are rich in timber, pines predominating; in minerals, chiefly gold, silver, coal, and iron, of all which little is extracted, though steps were being taken in 1890 to work the gold-mines in the Amur region; and in fur-bearing and other animals, as the sable, foxes, lynx, squirrel, tiger, bear, wolf, deer, &c. The Manchurian lark, a clever mimic, is exported in great numbers to China. The rivers swarm with salmon, and trout are plentiful. The climate is temperate in summer, especially whilst the rains last (May to September), but very severe in winter, the season of traffic, when the streams and extensive marshy tracts are frost-bound; the thermometer frequently falls as low as −25° F. in the northern province in the depth of winter. The soil is extremely fertile, and produces in abundance millet (with vegetables the chief food of the people), maize, hemp, poppy, beans, rice, vegetables, and ginseng. Wild silk is produced. The industry is

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confined to the making of furniture, coffins (sent to China), and carts, the tanning of leather, the preparation of furs, and the distilling of spirits. A large amount of trade is carried on at the towns in the interior, and especially at the treaty port of New-chwang (q.v.). Beans, bean cakes and oil, silk, ginseng, skins and furs, &c. are exported to the annual value of 1½ million sterling, and cottons, woollens, metals, sugar, silk, paper, medicines, opium, &c. imported to 1½ million sterling. The native opium is rapidly supplanting the Indian, the import of which fell from 327,067 lb. in 1879 to 12,266 lb. in 1889. Excessive floods in 1888 caused a severe famine. The population does not embrace more than one million Manchus, and most of these dress and speak like Chinese. Yet they are the aristocracy of the country, furnishing its magistrates and soldiers, its police, and its hunters, though many cultivate their own land. Ever since the Manchus conquered China (1644) and founded the present imperial dynasty Manchuria has been the favourite recruiting-ground for the Chinese army; there are stated to be 80,000 drilled men in the country. The rest of the population consists almost entirely of Chinese immigrants, as enterprising, industrious, and prosperous as any people in the empire. The principal towns are Moukden (q.v.), the capital; Kirin (q.v.); Tsitsihar, a convict settlement for the empire; Ying-tzu, commonly called New-chwang (q.v.), the chief port; and some others with populations of about 20,000. All Manchurian towns are indescribably filthy, worse than English towns in the 15th century, and most of them are walled. The religions current are those found in China (q.v.), though the original creed of the Manchus was Shamanism. Early in the 11th century B.C. there existed a native kingdom in the southern of the three provinces, and this was succeeded by other states, until in the beginning of the 17th century Nurhachu, a Manchu chief, founded a powerful sovereignty; in 1644 his grandson ascended the throne of China, and thus founded the reigning Chin dynasty. The conquerors imposed upon the conquered the custom of wearing the pigtail, shaving the forehead, and dressing in narrow-sleeved instead of wide-sleeved coats. Brigandage and gambling are exceedingly rife in the country. The Manchu language is a branch of the Mongol stem, as the people themselves are of the same division of the Ural-Altaic family. The French Roman Catholics have had missionaries in Manchuria since 1838, and the Scottish and Irish Presbyterian churches since about 1861. See James, *The Long White Mountain* (1888), where other books are quoted.

Mancini. See MAZARIN.

Mandæans, an oriental religious sect of great antiquity, formed out of heterogeneous Christian, Jewish, and heathen elements, and still found about the cities of Wâsit and Basra, and in Khûzistân (*Susiana*) on the eastern shore of the Tigris, working as jewellers, blacksmiths, carpenters, &c. The name is due to the word *Mandâ*, 'gnosis' (whence Mandâyê, 'gnostics'), but the public name they take is that of Sabians (*Subbâ*, 'baptiste'), thus professing to identify themselves with the Sabæans tolerated in the Koran. They were formerly called Christians of St John the Baptist from their habit of baptism or ablution. In their religious system the supreme is *Pirâ rabbâ* ('the great glory'), with which is connected the *Mânâ rabbâ*, which, after calling forth the first life, retired into an obscurity that can be penetrated only by the most holy after death, and that but once. The first life (*Chayê Kadmâyê*) is the active deity as revealed, and which alone can be worshipped. From it, besides the 'second life,' emanated the *Mandâ d'hayyê* ('spirit of life'), the mediator and saviour of the Mandæans, from whom they derive their name. He reveals himself to man in his three sons, *Hibil*, *Sitil*, and *Anûs;* of these Hibil is the most important. From the second life emanated the Uthrê ('angels'), the greatest of whom is Abâtûr, whose son Gabriel built the earth and formed man, save that his spirit was infused into him by *Mânâ rabbâ*. There is an elaborate cosmogony extending to the kingdoms of darkness, of hell, the mountains of the blessed, and the planets. The succession of false prophets from Nû were Abrahîm, Mîshâ (Moses), Shîlîmûn (Solomon), and Yishu M'shîha (Jesus), who had been baptised through deceit by the only true prophet, Yahyâ. The last of the false prophets is M'hamad.

The Mandæans had three degrees in the priesthood, with a supreme official (Rîsh ammâ) as the source of both civil and ecclesiastical authority. The priests officiate in white robes, barefooted, and women may be admitted to their order. Their principal rite is the *masbatha* or baptism. Their sacred language is an Aramaic dialect close to the Babylonian Talmud. They have five important sacred books: *Sidrâ rabbâ* ('the great book'), called also *ginza*, 'treasure;' *Sidrâ d'Yahyâ* ('book of John'); the *Qolasta*, a collection of hymns; *Diwân*, a ritual; and *Asfar Malwâsê*, a manual of astrology.

Brandt traces this system of religion back to the period of amalgamation of the Assyro-Babylonian religious spirit with the philosophical speculation of the Greeks.

See Chwolsohn, *Die Sabier u. der Sabismus* (1856); Siouffi, *Études sur la Religion des Soubbas ou Sabéens* (1880); E. Babelon, *Les Mendâïtes, leur Histoire et leurs Doctrines religieuses* (1882); and especially Dr Brandt, *Die Mandäische Religion* (1889).

Mandalay, the capital of Upper Burma, stands 2 miles from the left bank of the Irawadi, a little N. of Amarapura (q.v.), the former capital, and 410 miles by rail (1888) N. of Rangoon. Founded in 1860, it was the capital of independent Burma until its capture by the British in the end of 1885, and since the treaty by which (1886) the king lost his throne it has been the capital of Upper Burma. The city forms a square, each side a mile long, and is surrounded by a wide moat, a crenelated brick wall 26 feet high, and an inner earthen parapet. In the centre of the city stand the royal palaces, constructed principally of teak-wood, and enclosed by three stone walls and a teak-wood stockade. There is little of real interest or beauty in them beyond some rich wood-carving. The most famous building in Mandalay is, however, the Aracan Pagoda; it contains a brazen image of Buddha, 12 feet high, an object of veneration to thousands of pilgrims. Outside these enclosures was, until the British conquest, a crowded, dirty native town, now cleared away to make room for a British cantonment. The present native quarters lie outside the fortified city. Beyond them, again, on the slopes of the hills that border the valley of the Irawadi, are numerous fine monasteries. Pop. 65,000. Silk-weaving is the most important of the industries; the others are gold and silver work, ivory and wood carving, bell and gong casting, and knife and sword making. In 1886 one-tenth of the city was burned to the ground, and an inundation of the river caused immense damage. In the same year a meteorological observatory was built.

Manda'mus is a writ, not of right but of prerogative, which issues from the Court of Queen's Bench, commanding some public body, or inferior court, or justices of the peace, to do something which it is their legal duty to do. In the United States the power to issue writs of mandamus is vested in

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the Supreme Court, and is also allowed to the circuit courts, subject to considerable restrictions.

Mandarin, a general term applied to Chinese officers of every grade by foreigners, derived from the Portuguese *mandar*, 'to command.' For the Chinese governmental authorities, their rank and distinctive buttons, see CHINA, Vol. III. p. 191.

Mandeville, BERNARD DE, English satirical writer, though born of Dutch parents at Dordrecht in Holland in 1670. He graduated in medicine at Leyden, after six years of study, in 1691, and immediately afterwards settled in London to practise his profession; he died in that city in 1733. He is known as the author of a short work in doggerel verse entitled *The Fable of the Bees*, which, as finally published in 1723, included the fable itself, called *The Grumbling Hive*, first printed in 1705, *Remarks on the Fable*, and *Inquiry into the Origin of Moral Virtue*, both added to the 1714 edition, and *An Essay on Charity Schools* and *Search into the Origin of Society*, added in 1723. This book was a pothouse fulminant, levelled against the ethical theories of Shaftesbury, who set up as the standard of virtue the ultra-refined tastes of an idealistic æsthete. Mandeville, writing in a vein of extremely coarse and brutal paradox, cynical in its frankness, though frequently of striking acuteness, affirms that 'private vices are public benefits,' and that every species of virtue is at bottom some form of gross selfishness, more or less modified. Thus he over-emphasises the baser elements in human nature, as Shaftesbury does the 'dignified.' The book was condemned by the grand jury of Middlesex as being immoral and pernicious in its teaching. Besides that, it was attacked by Law (q.v.) the nonjuror, by Berkeley, by Brown, Warburton, Hutcheson, and others. Mandeville in his defence states that he wrote in irony for the diversion of people of discernment and knowledge, and his words were not to be taken in literal earnest, as if meant for general readers. Nevertheless, his other works, such as *The Virgin Unmasked*, *Free Thoughts on Religion*, &c., detract greatly from the sincerity of this plea. It is worth while observing that his realistic habits of thought bring him in some respects curiously into touch with the exponents of modern scientific methods of inquiry.

See Leslie Stephen, *Essays on Freethinking* (1873), or the briefer summary in vol. ii. of the same writer's *English Thought in the 18th Century* (1876).

Mandeville, JEHAN DE, the name assumed by the compiler of a famous book of travels, written in French, and published between 1357 and 1371. Versions in Italian, Spanish, Dutch, Walloon, German, Bohemian, Danish, and Irish are found, and the number of MSS. amounts to at least 300. Many have maintained the priority of the Latin text, which exists in as many as five independent versions, but it seems much more probable that the French was the earlier. The earliest edition of the French text was printed at Lyons in 1480. Indeed, it is most probable that the book was written under a feigned name by the physician Jehan de Bourgoigne, otherwise Jehan à la Barbe, who is stated in an early Latin edition to have met Mandeville first at Cairo, and again at Liége, and to have persuaded and helped him to write his travels. There can be little doubt that this statement of Bourgoigne's was merely an ingenious blind, and that he alone was the author of the book. But a statement has been discovered that Bourgoigne revealed on his death-bed his real name of Mandeville to Jean d'Outremeuse, explaining that he had had to flee from his native England for a homicide. We are told further that this physician, who died in 1372, had practised his profession at Liége since 1343. And it is apparently quite certain that in the 16th and 17th centuries a tomb was shown at Liége, with a Latin inscription stating that Mandeville died there in November 1372. An English version was made from a defective French manuscript at least as early as the beginning of the 15th century, and two extant independent revisions of this followed within a quarter of a century. The original defective form was printed by Pynson and Wynkyn de Worde (1499); the editions of 1725 and the well-known reprints by Halliwell (1839 and 1866) represent one of these later revisions; that first printed for the Roxburghe Club in 1889 is an admirable edition of the other. But the glaring errors of translation render it impossible that either of these forms of the English version can be from the hand which wrote the original work, in spite of the statement in the preface, which has been too easily believed, that it was made by Mandeville himself. None the less it remains an admirable monument of English, but the name of Sir John Mandeville should now disappear from histories of literature as the 'father of English prose.'

In the preface the French compiler describes himself as a knight born at St Albans, who left his native country in 1322, travelled by way of Turkey, Armenia, Tartary, Persia, Syria, Arabia, Egypt, Libya, Æthiopia, Amazonia, and India, often visited Jerusalem, and who wrote in Romance as better understood than Latin. In the course of the book we are told further that he had served the sultan of Egypt against the Bedouins, and the emperor of China against the king of Manzi; that he had seen the glory of Prester John and drunk of the Fountain of Youth at Palombe (Quilon on the Malabar coast), and returned home unwillingly owing to arthritic gout in 1357.

By far the greater part of the book has now been proved to be borrowed, with interpolations, usually extravagant, from the narrative of Friar Odoric (written about 1330); from Hayton, an Armenian who became a Premonstratensian monk, and dictated at Poitiers in 1307 a book about the East in the French tongue; from the work of the Franciscan Carpini; from the well-known *Epistle* of Prester John, widely known in the 13th century; from Albert of Aix, Brunetto Latini, Peter Comestor, Jacques de Vitry, Vincent de Beauvais (*Speculum Historiale* and *Speculum Naturale*); from the 12th-century Latin itineraries of Palestine, and from the work of the German knight William of Boldensele, written in 1336. A small portion of the book may still represent actual travels and personal knowledge, especially in the part relating to the Holy Land; but this does not re-establish the honesty of the writer, who claims himself to have travelled in the remotest regions described, and to have seen with his own eyes the wonders enumerated, while he never mentions Odoric, from whom he conveyed by far the greater part of his book. Among these wonders we find stories of fabulous monsters, such as anthropophagi, and men whose heads grew beneath their shoulders, the phœnix, the vegetable lamb, the weeping crocodile, the garden of transmigrated souls at Cansay (Hang-choo-foo), and the Valley Perilous. Of the Terrestrial Paradise, however, the writer is candid enough to say that he had not been there.

See the article by Colonel Yule and E. B. Nicholson in vol. xv. (1883) of the *Encyclopædia Britannica*, and the latter's letter in the *Academy* for April 12, 1884; Dr Albert Bovenschen, *Quellen für die Reisebeschreibung des Johann von Mandeville* (Berlin, 1888); and the Introduction by G. F. Warner to his edition for the Roxburghe Club (1889), in which the views of Dr Vogels and Dr Carl Schönborn are also discussed.

Mandible, a name applied to various jaw-organs—e.g. the third pair of appendages in Crus-

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taceans, the first pair of true appendages in Insects, the lower jaw in Vertebrates.

Mandingoes are a Bantu people of Africa, mainly in Senegambia (q.v.). See AFRICA, Vol. I. p. 85.

Mandogarh, or MANDU', a ruined city of India, formerly capital of the Mohammedan kingdom of Malwa, stands 15 miles N. of the Nerbudda and 38 SW. of Indore. The ruins stretch for 8 miles along the crest of the Vindhya Mountains, and have a circumference of 37 miles. A deep, narrow valley separates them from the adjoining tableland. The least injured of the ruined buildings is the great mosque, which is reached by a handsome flight of stairs; it is said to be 'the finest and largest specimen of Afghan architecture extant in India.' There are also a massive royal palace and the white marble mausoleum of the king who raised the city to the acme of its splendour (early 15th century). According to Malcolm, Mandogarh was founded 313 A.D.

Mandoline, a musical instrument of the lute species. The body of the mandoline is formed of a number of narrow pieces of different kinds of wood, bent into the shape, and glued together. On the open portion of the body is fixed the sounding-board, with a finger-board and neck like a guitar. The Neapolitan mandoline, which is the most perfect, has four double strings, tuned (beginning with the lowest) G, D, A, E. The Milanese mandoline has five double strings, tuned G, C, A, D, E. The sound is produced by a plectrum in the right hand, while the left hand produces the notes on the finger-board. The mandoline is chiefly used for accompaniment.

Mandrake (*Mandragora officinalis*), a Solanaceous plant closely allied to Belladonna (q.v.). There are two varieties, the vernal and the autumnal; both are natives of the Mediterranean region and the East, and especially abound in Greece. The whole plant has a very fetid narcotic smell; and all parts have poisonous properties like those of belladonna, but more narcotic, for which reason a dose of the root was formerly sometimes given to patients about to endure surgical operations. The ancients were well acquainted with the narcotic and stupefying properties of mandrake, and it was a common saying of a sleepy or indolent man that he *had eaten mandrake.* The large taproot grows somewhat irregularly, and often seems divided into two, through the development of a branch which attains more or less equal size. Hence arises a rude resemblance to a human figure; and this is easily exaggerated by a little judicious pruning or carving, and by trimming the covering of fine hair-like roots. Hence Pythagoras speaks of the mandrake as *anthropomorphic.* To such mannikin-figures many magical virtues were ascribed: by the ancient Germans they were supposed to bring luck to their possessors, who accordingly dressed and tended them like dolls, yet kept them reverentially enshrined in caskets, and thus obtained their services for the healing of obstinate diseases of man and beast, for the divination of the future, or the ensuring of supplies of money. From the most ancient times aphrodisiac virtues have been ascribed to mandrake, which was therefore supposed to cure barrenness (see Gen. xxx. 14–16); such repute is hardly borne out by the actual properties of the root (which would, however, relax the womb), but probably more commonly depended on its magical associations as a phallic figure. The extremely narcotic and poisonous properties of the plant could not but invest these figures with a more grim significance, of which the medieval imagination made the most. So large, deep, and well fixed a root needs some labour to dig out, and, if torn up by main force, breaks with more or less noise, hence the ancient legend that the mandrake shrieks when torn out of the ground. The subsequent possibilities of accident (not to speak of misuse) can easily be imagined, not only from the sweet and attractive berries, but the leaves, root, or even juice. On the base of caution there arose a whole fantastic ritual: the plant could only be safely dug up at midnight, and when loosened by careful digging should be dragged out of the ground by a black dog, which served as a vicarious substitute for the herbalist, in dread of the mandrake's vengeance.

Mandrake (*Mandragora officinalis*).

Mandrill. See BABOON.

Manduria, a town of Southern Italy, 22 miles E. by S. of Taranto, near the ancient town of Manduria, of which some important relics are still extant. Pop. 8865. In 1790 it exchanged its name of Casalnuovo for Manduria.

Mandvi, the chief seaport of the principality of Cutch, in India, on the north shore of the Gulf of Cutch, 36 miles SW. of Bhuj, the capital. It has a good roadstead and a breakwater, but the harbour is choked with sand. The pilots are in request all through the state. Pop. (1881) 35,980.

Manes. See LARES.

Manet, ÉDOUARD (1832–82), a French painter, the founder of Impressionism (q.v.). See his Life by Bazire (Paris, 1884).

Manetho, a celebrated Egyptian historian, native of Sebennytus, a priest who flourished in the 3d century B.C. See EGYPT, Vol. IV. p. 238.

Manfred, regent and king of Sicily, was a natural son (afterwards legitimised) of the Emperor Frederick II. by Bianca, the daughter of Count Lancia, and was born in 1231. On his father's death in 1250 he received the principality of Tarentum, and in the absence of his half-brother, Conrad IV., acted as regent in Italy. He bravely defended his sovereign's interests against the aggression of Pope Innocent IV.; and after Conrad's death he was acknowledged as regent of Apulia, in name of his nephew Conradin (q.v.). The pope, however, renewed his pretensions to Apulia, and compelled Manfred to flee for shelter to the Saracens, by whose aid he defeated the papal troops, and became, in 1257, master of the whole kingdom of Naples and Sicily. On the rumour of Conradin's death he was crowned king at Palermo, 11th August 1258, and immediately afterwards was excommunicated by Pope Alexander IV. along with his adherents; but Manfred invaded the papal dominions, and made himself master of the whole of Tuscany. His power now seemed secure, and his government was at once mild and vigorous. But this tranquillity was not of long duration. Pope Urban IV. renewed the excommunication

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against him and his friends, and bestowed his dominions as a papal fief on Charles of Anjou, the brother of Louis IX. of France. Manfred, though at first successful in the war which ensued, was at last treacherously defeated, and slain in a bloody battle at Benevento, 26th February 1266. His body was interred as that of an excommunicated person. His widow and children were barbarously treated by the French; the widow and three sons died in prison; the daughter was confined for twenty-two years. His history has been made the subject of drama and opera. See Cesare, *Storia di Manfredi* (1837); Schirrmacher, *Geschichte der letzten Hohenstaufen* (1871).

Manfredonia, a walled seaport of Italy, on the Gulf of Manfredonia, a bay of the Adriatic, 23 miles by rail NE. of Foggia. Founded by Manfred in 1261 from the ruins of ancient Sipontum, it has an old castle and a cathedral. Pop. 8324.

Mangalore, a seaport and military station, and chief town in the district of South Kanara, in the presidency of Madras, India. A clean, picturesque town, embosomed in cocoa-nut palm groves, it ships large quantities of coffee (from Coorg and Mysore) in small Arabian and Indian vessels. The total trade reaches an annual average of nearly £780,000 in value. Pop. (1881) 32,099, including a large body of Roman Catholics, who have here a bishop and a college. Mangalore is also the headquarters in India of the Basel Lutheran Mission, the members of which teach their people to weave cloth, print and bind books, and make roof tiles. The town, which was three times sacked by the Portuguese in the 16th century, was taken by Hyder Ali in 1763, and made the headquarters of his navy. In 1784 its English garrison yielded to Tippoo Sultan after a nine months' siege. It became British in 1799, and was burned by the Coorg rebels in 1837.

Mangan, James Clarence, a gifted but hapless Irish poet, who was born in 1803, and employed for many years in the drudgery of copying in an attorney's office. His heart was framed for suffering, and his whole life was a tragedy of hapless love, poverty, and intemperance, until he found rest in death at Meath Hospital, Dublin, 20th June 1849. There is fine quality in his original verse, as well as in his translations from the German, but more especially from the old Irish, as in the impassioned ballad of *Dark Rosaleen*. His *German Anthology* was published in two volumes in 1845, a complete edition of his poems at New York in 1870, with a biographical introduction by John Mitchel.

Manganese (sym. Mn; atomic weight, 55) is one of the heavy metals of which iron may be taken as the representative. It is darker in colour than wrought iron, is capable of a high degree of polish, and is so hard as to scratch glass and steel. It is only feebly attracted by the magnet, and oxidises readily on exposure to the air. The metal occurs in nature in small quantity along with iron in meteoric stones, but may be obtained in large amount by the reduction of its sesquioxide or carbonate by charcoal at an extreme heat.

With oxygen it forms six compounds: manganous oxide, MnO; manganic oxide, Mn_2O_3; manganoso-manganic oxide, Mn_3O_4; manganese dioxide, MnO_2; manganic anhydride, MnO_3; and permanganic anhydride, Mn_2O_7. Like iron it forms protosalts, $MnCl_2$, and persalts, Mn_2Cl_6. It also forms salts derived from an acid, H_2MnO_4, such as potassium manganate, K_2MnO_4, and from an acid, $HMnO_4$, as potassium permanganate, $KMnO_4$. The *binoxide*, MnO_2, is the chief form in which manganese is found in nature, and is the general source of the other compounds. It is known to mineralogists as pyrolusite, and in commerce as black manganese or manganese simply. When heated alone or with sulphuric acid it gives off oxygen, and when heated with hydrochloric acid chlorine is evolved. It is largely used in the manufacture of glass, to which it imparts a purple colour. It is also supposed to colour the amethyst.

Manganous oxide, MnO, is an olive-green powder. Its salts are colourless, or of a pale rose colour. The sulphate, $MnSO_4$, in pink crystals, is largely used by the calico-printer for the production of black and brown colours, by decomposing it with bleaching powder or an alkali.

Manganic oxide, Mn_2O_3, in octahedral crystals, forms the mineral braunite, and in the hydrated form, $Mn_2O_3.H_2O$, the mineral manganite.

Red oxide of manganese, Mn_3O_4, is formed when any of the other oxides are heated in the air. It is found in nature as the mineral hausmannite.

Manganic anhydride, MnO_3, is not known in the free state. It forms a hydrated acid, H_2MnO_4, which forms salts. Manganate of potassium, K_2MnO_4, is the best known of these. It is in green crystals, and on allowing its solution to stand exposed to the air it rapidly becomes blue, violet, purple, and finally red, by the gradual conversion of the manganate into the permanganate of potash; on this account it is sometimes called chameleon mineral.

Permanganic anhydride, Mn_2O_7, is only known in solution or in a state of combination. Its solution is of a splendid red colour, but appears of a dark violet tint when seen by transmitted light. Permanganate of potash, $KMnO_4$, which crystallises in reddish-purple prisms, is the most important of its salts. It is largely employed in analytical chemistry, and is the basis of Condy's Disinfectant Fluid.

Manganese is a constituent of many mineral waters, and is found in small quantity in the ash of most vegetable and animal substances. It is almost always associated with iron. Various preparations of manganese have been employed in medicine. The binoxide has been used as a substitute for bismuth in dyspeptic affections, while various preparations have been tried as substitutes for iron in anæmia, but with disappointing results. The manganate and permanganate of potash readily part with their oxygen, and in weak solution are used as disinfecting and astringent lotions.

Mange, a contagious disease in horses, dogs, and cattle, is, like scab in sheep, very similar to itch in the human subject, resulting from the attacks of minute mites or *acari*. Some of these burrow in the skin, others move about upon the skin, especially if it be dirty or scurfy, and cause much irritation, heat, and itching, and the eruption of minute pimples, with dryness, scurfiness, baldness, and bleaching of the skin. The treatment consists in destroying the *acari*, and insuring the cleanliness and health of the skin, both of which objects are effected by washing the parts thoroughly every second day with soft soap and water, and dressing daily with sulphur or mild mercurial ointments, or with a solution containing four grains either of corrosive sublimate or arsenic to the ounce of water. Castor-oil seeds, bruised and steeped for twelve hours in buttermilk, are very successfully used by the native Indian farriers. Where the heat and itching are great, as is often the case in dogs, a few drops of tincture of belladonna may be used to the usual dressing, or applied along with a little glycerine. Where the general health is indifferent, as in chronic cases, the patient should be liberally fed, kept clean and comfortable, have an occasional alterative dose of any simple saline medicine, such as nitre or common salt, and a course of such tonics as iron or arsenic. Cleanliness and

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occasional washing and brushing maintain the skin in a healthy state, and thus prevent its becoming a suitable nidus for the *acari*.—The Sarcoptic mange, due to a burrowing mite, besides being highly contagious, is often fatal, and is specially legislated for in the Shetland Islands, where it is very prevalent, under the Contagious Diseases (Animals) Acts.

Mangnall, RICHMAL, of Irish extraction, but born in London, was the head-mistress of a ladies' school near Wakefield, and died in 1820. Few particulars of her personal history have been preserved; she survives only in her redoubtable *Questions*, the pride and terror of several generations of school-girls. She was an amiable and excellent woman, but as a writer she has been well called 'the very high-priestess of the great god Cram.' Of the popularity of her schoolroom encyclopædia, compiled entirely by herself, there can, however, be no doubt: an impression, printed in 1857 in America, was taken from the 84th London edition. It has been reprinted in England and in the United States as recently as 1886.

Mango (*Mangifera indica*, natural order Anacardiaceæ), one of the most esteemed fruits of India. The tree grows from 40 to 50 feet high, with spreading top and numerous branches, at the extremities of which are the densely-crowded long lanceolate leaves. When in flower it bears some resemblance to the Sweet Chestnut. The fruit,

Common Mango (*Mangifera indica*).

which is a fleshy drupe, when fully ripe is somewhat kidney-shaped or oval, varying in size from that of a small hen's egg to a large goose's egg, in colour yellow or reddish, speckled with black, and containing a large flattened stone, the kernel of which is nutritious. There are several varieties of mango. Some have the flesh of the fruit full of fibres, and are on that account considered inferior; those that cut like an apple, and have few or no fibres, are the most highly esteemed. The fruit is eaten without any preparation, except peeling the outer rind off. Jellies, preserves, and tarts are made of the unripe fruit, and it is also pickled. Mango was introduced into Jamaica in 1782, and is now very generally cultivated in tropical and subtropical countries. The tree is ordinarily raised from seeds, but, as the finer varieties cannot be depended upon to come true from seeds, they are increased by layering and inarching. *M. sylvatica*, besides being eaten when ripe and fresh by the natives of India, is dried and used medicinally. *M. oppositifolia*, the fruit of which is of the size of a pullet's egg, is much esteemed in Burma.

Mangold-wurzel, or MANGOLD, a German name in general use in Britain and America to designate the varieties of the Common Beet (q.v.) cultivated in fields for the feeding of cattle—*Beta vulgaris* of the natural order Chenopodiaceæ. The field beets differ from the garden beets chiefly in being larger in all their parts, and coarser. They have large roots, which in some of the varieties are red, in others greenish or whitish, in some carrot-shaped, and in others nearly globular. The cultivation of mangold as a field-crop was introduced from France into England in 1786. At first, so little was its value known, that the leaves alone were used as food for cattle. Its importance, however, was soon appreciated, and it rapidly gained favour. It is much more patient of a high temperature than the turnip, liable to fewer diseases, and vastly more productive under favourable conditions. In highly-manured grounds in the south of England as much as from 60 to 70 tons to the acre have been raised; throughout the south of England it is generally admitted that it is as easy to grow 30 tons of mangold to the acre as 20 tons of Swedish turnips. The lower temperature of Scotland, however, does not admit of the crop being raised there to advantage. The mode of culture does not vary materially from that followed in raising turnips. The land in which the crop is to be planted receives a deep furrow in autumn; and, if it is quite free from perennial weeds, it is often previously well manured. Mangolds are sown both in rows on the flat ground and in drills raised by the plough—the former from 18 to 25 inches apart, and the latter from 25 to 28 inches wide. From 12 to 16 tons of dung with from 2 to 3½ cwt. of superphosphate, 2 to 3 cwt. common salt, and 2 to 3 cwt. nitrate of soda per acre are common dressings for mangolds. Indeed, this crop can hardly be over-manured. It requires 6 or 7 lb. of seed to the acre; and, as the grains are enclosed in a hard and rough coat, they are steeped in water for two days previous to their being planted, for the purpose of promoting a quick and regular 'braird.' The long red, the round red, and the orange and yellow globes are all favourite varieties in England. As soon as the plants are about 3 inches above ground, they are singled out by the hand, and their cultivation is afterwards the same in all respects as in the case of Swedish turnips. The crop should always be stored by the end of October, and should not be consumed till the following spring, by which time the roots have lost their tendency to produce scour in animals, and have greatly improved in feeding value. Care has to be taken not to injure the leaves or bulbs, as they are liable to suffer from 'bleeding.' The roots are stored in pits or 'clamps,' covered with straw and a little earth, as a protection in severe weather.

Mangonel. See BALLISTA.

Mangosteen, produced by *Garcinia mangostana* (natural order Clusiaceæ), is considered the most delicious and wholesome of all fruits. The tree, which is a native of the Moluccas, grows about 20 feet high in very regular symmetrical form. The leaves are large, oval, entire, deep dark green above with a dull lustre, olive-green below. The open flowers resemble those of a red rose, but have only four petals. The fruit, in size and shape, resembles a middling-sized orange; it is dark brown, spotted with yellow or gray, has a thick rind, and is divided internally by thin partitions into cells. The pulp is soft and juicy, of a rose colour, refrigerant and slightly laxative, with a mixture of sweetness and acidity, and has an extremely delicate flavour. It may be eaten very freely with perfect safety, and is esteemed very beneficial in fevers. It is cultivated in Java and

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in the south-east of Asia; it has recently become common in Ceylon, and has been successfully introduced into other tropical countries.

Mangrove (*Rhizophora*), a genus of calycifloral dicotyledons, including about fifty species, of which the indistinct affinities have constituted a separate order (Rhizophoraceæ). They are trees and shrubs, all tropical (especially South American), and natives of coasts, particularly about the mouths of rivers, where they grow in the mud, and form a close thicket down to and within the margin of the sea, even to low-water mark, forming the characteristic mangrove-swamps so often described

A Mangrove-swamp.

by travellers and naturalists. Most species send down roots from their branches, and thus rapidly extend over large spaces, forming secure retreats for multitudes of aquatic birds, whilst crabs and shell-fish are also to be found in them in vast numbers. Their interlacing roots retain mud, seaweed, &c., and thus rapidly form soil and encroach upon the shallow sea; on the north coast of Java and elsewhere their geological importance is specially marked. The seeds have the peculiarity of germinating before the fruit has fallen, a long thick radicle proceeding from the seed, piercing its covering, and extending rapidly downwards. When the fruit drops, the stout heavy radicle pierces the mud, and the young tree is thus planted in the proper position forthwith. The fruit of the common mangrove (*R. Mangle*) is sweet, eatable; and its juice, when fermented, yields a light wine. The bark is sometimes imported for the sake of its tannin, in which all the species are rich. Mangrove wood is also imported from the West Indies. The Chinese and East Indian species (*R. gymnorhiza*, &c.) are of similar habit and properties; some of the latter are separated as a distinct genus, Bruguiera.—The so-called *White Mangrove* is Avicennia (q.v.).

Manhattan Island, the island on which the great part of New York city stands.

Mania. See INSANITY.

Manica, a gold-field long worked by the Portuguese, 130 miles NW. of the port of Sofala.

Manichæus, or MANI, the founder of the heretical sect of the Manichæans, of whose life the most legendary and contradictory accounts are given through two distinct sources—the Western or Greek, and the Oriental or Mohammedan—the latter alone being apparently worthy of belief. According to it Mani was a native of Ecbatana, born probably about 215 A.D., and had his education at Ctesiphon under his father Futak, who joined the sect of the *Moghtasilah* (Baptists) in which his son was brought up. This sect was connected with the Mandæans (q.v.), and most probably also with the Elkesaites and Hemerobaptists, and may also have borrowed something from Christianity. At about the age of thirty Mani began to proclaim his new religion at the court of the Persian king, Sapor I., and then undertook long missionary journeys, returning to the court about 270. Pursued by the enmity of the Magians he was obliged to flee, was protected by the next king, Hormuzd, but under his successor, Bahram I., was abandoned to the hatred of his enemies, who crucified him in 276 and flayed his lifeless body. His numerous epistles and writings are lost, and we know of them only from the Arabic catalogue, the *Fihrist*, and from allusions in Epiphanius, Augustine, and Photius.

MANICHÆISM was a great religious system that sprung up in western Asia about the close of the 3d century, and which, although it utterly disclaimed being denominated Christian, yet was reckoned among the heretical bodies of the Church. It was not an offshoot from Christianity, but was based on the ancient Babylonian religion, and was thus really a Semitic religion of nature modified by Christian and Persian elements, systematised and elevated into a gnosis, and made applicable to human life by a deduced system of ethics. But, while it borrowed nothing from Christianity proper, it derived part of its terminology and some of its conceptions from Christianity as developed among the sects of the Basilidians, Marcionites, and Bardesanites. The Western Manichæans adopted many Christian elements which were not present in the original system of its founder nor in its purer Eastern development. It is possible, although it has not yet been satisfactorily proved, that it borrowed some elements from Buddhism. Baur was the first to work out the theory of a Buddhist element, and was followed by Neander, Hilgenfeld, and other scholars; but his argument has been assailed by Le Page Renouf, Zeller, Lightfoot, and Harnack. Manichæism was essentially a complete dualism, materialistic in so far as the physical and ethical were confounded, and its success, says Harnack, was due to the fact that it united an ancient mythology and a thorough-going materialistic dualism with an exceedingly simple spiritual worship and a strict morality. As has been said, it assumed two chief principles, whence had sprung all visible and invisible creation, and which—totally antagonistic in their natures—were respectively styled the Light, the Good, or God, and the Darkness, the Bad, Matter, or Archon. They each inhabited a region akin to their natures, and excluding each other to such a degree that the region of Darkness and its leader never knew of the existence of that of the Light. Twelve æons—corresponding to the twelve signs of the zodiac and the twelve stages of the world—had emanated from the Primeval Light; while Darkness, filled with the eternal fire, which burned but shone not, was peopled by *demons*, who were constantly fighting among themselves. In one of these contests, pressing towards the outer edge, as it were, of their region, they became aware of the neighbouring region, and forthwith united, attacked it, and succeeded in carrying captive the Ray of Light that was sent against them at the head of the hosts of Light, and which was the embodiment of the Ideal or Primal Man. The God of Light himself now hastened to the rescue, and with the help of new æons defeated Darkness and set free the primal man in his greater and better part. The smaller and fainter portion, however—the *Jesus patibilis* of the Western Manichæans—remained in the

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hands of the powers of Darkness, and out of this they formed, after the ideal of the Man of Light, mortal man. But even the small fraction of light left in him, broken in two souls, would have prevailed against them, had they not found means to further divide and subdivide it by the propagation of this man. Thus man was originally formed in the image of Satan, but contained within him a spark of the heavenly light, which awaits its final deliverance by separation from the enveloping darkness. The demons sought to obscure it further by sensuality and dark forms of belief and faith, such as Paganism and Judaism; but the spirits of Light are constantly engaged in drawing out the dimmed and buried light hidden in the world, by opening up to men the true *gnosis* of nature, and weaning them away from sensuality and error. Thus there appeared in the world a succession of teachers, as Adam, Noah, Abraham, and probably Zoroaster and Buddha. Jesus also was such a teacher, but he was neither the historical Christ of Christianity, nor the Messiah of the Jews, but a phantasmal Jesus (*Jesus impatibilis*), who did not actually suffer, as he seemed, on the cross, but only allowed himself to become an example of endurance and passive pain for his own, the souls of light. Since even his immediate adherents, the apostles, were not strong enough to suffer as he had commanded them, he promised them a Paraclete, who should complete his own work. This Paraclete was Mani, who surrounded himself, like Christ, with twelve apostles, and sent them into the world to teach and to preach his doctrine of salvation. The end of the world will be fire, in which the region of Darkness will be consumed.

To attain to the region of eternal light, it is necessary that Passion, or rather the Body, should be utterly subdued; hence rigorous abstinence from all sensual pleasures—asceticism, in fact, to the utmost degree—is to be exercised. The believers are divided into two classes—the *Electi* (*Perfecti*) and the *Catechumeni* (*Auditores*). The Elect have to take the oath of abstinence from evil and profane speech (including 'religious terms such as Christians use respecting the Godhead and religion'), and from flesh, eggs, milk, fish, wine, and all intoxicating drinks; from the possession of riches, or, indeed, any property whatsoever; from hurting any being—animal or vegetable; from heeding their own family, or showing any pity to him who is not of the Manichæan creed; and finally, from breaking their chastity by marriage or otherwise. The *Auditors* were comparatively free to partake of the good things of this world, but they had to provide for the subsistence of the *Elect*, and their highest aim also was the attainment of the state of their superior brethren. In this Manichæan worship, the Visible Representatives of the Light (sun and moon) were revered, but only as representatives of the Ideal, of the Good or supreme God. Neither altar nor sacrifice was to be found in their places of religious assemblies, nor did they erect sumptuous temples. Fasts, prayers, occasional readings in the supposed writings of Mani, were all their outer worship. The Old Testament they rejected unconditionally; of the New Testament they adopted certain portions, as revised and redacted by the Paraclete. Sunday, as the day on which the visible universe was to be consumed, the day consecrated to the sun, was kept as a great festival; and the most solemn day in their year was the anniversary of the death of Mani. The later Manichæans celebrated mysteries analogous to the Christian sacraments of Baptism and the Lord's Supper. St Augustine belonged to the sect for about nine years, and is our chief authority on this subject.

The outward history of the sect is one of almost continuous persecution. Yet it spread rapidly from Persia and Mesopotamia to Syria, northern Africa, and even Constantinople and Rome, drawing adherents from the remnants of the old Gnostic sects, especially from the Marcionites, and on the other hand from men of a rationalistic temperament who were repelled by such dogmas as that of the Incarnation. Both the Roman and Byzantine emperors enacted stringent laws against the Manichæans, the most severe being Valentinian III. and Justinian. Pope Leo the Great persecuted them in Rome, and in northern Africa they were exterminated by the Vandals. But their peculiar doctrines lingered on into the middle ages, and influenced many sects, as the Priscillianists, Paulicians, Bogomiles, Catharists, and Albigenses.

See Beausobre, *Hist. critique de Manichée et du Manichéisme* (1734); Baur, *Das Manich. Religionssystem* (1831); Flugel, *Mani* (1862); Kessler's *Untersuchung zur Genesis des Manich. Religionssystem* (1876), and his excellent articles, 'Mani' and 'Manichäer,' in vol. ix. of Herzog-Plitt's *Real-Encyclopädie;* Geyler, *Das System des Manichæismus* (1875); also Harnack's admirable article in the *Encyclopædia Britannica.*

Manihiki Islands, a group of low, wooded atolls, scattered over the central Pacific, between the Marquesas and Union groups, with a total area of some 55 sq. m., and pop. of 1600. Most of these islands, as Caroline, Malden, Starbuck, Penrhyn, Humphrey, Vostok, Flint, and two or three others, belong to Britain.

Manila (by English people often spelt *Manilla*), chief town of the Philippine Islands and capital of the Spanish possessions in eastern Asia, stands on the east side of a wide bay on the south-west coast of Luzon, 650 miles SE. of Hong-kong, with which city it has been connected by telegraph since 1881. It is divided into two portions by the little river Pasig. On the south bank stands the sleepy old town (founded in 1571 by Legazpi), surrounded by crumbling walls, with tolerably wide straight streets crossing each other at right angles. Here are the archbishop's palace, numerous churches and monasteries, the cathedral, mint (closed in 1889), university, Jesuit observatory, arsenal, and the barracks of the Spanish garrison. On the north bank are the modern suburbs, Binondo, &c., the commercial and native quarters, with the palaces of the governor-general and the admiral of the station. The city is liable to visitations of earthquakes, typhoons, and thunderstorms of exceptional violence: for instance, a violent earthquake did great damage in 1880, whilst a hurricane in 1882 ruined half the city. For this reason many of the old stone houses and churches are in ruins, the streets are lighted, not with gas, but with kerosene oil lamps, and most of the newer houses are built of wood. The native houses are generally constructed of bamboo and thatched with the leaves of the nipa palm. Glass is not used in the windows, but the flat shell of a large oyster, and the window-frames all slide horizontally. This is to exclude the great heat, the mean for the year being 82° F.; but during the rainy season (May to November) it ranges from 65° to 68°. The total population is estimated at nearly 300,000, for the most part native Tagals, though there are some 25,000 Chinese, large numbers descended from these two races, and about 5000 Spaniards. The people are fond of dancing and music; but the predominant passions of the native population are cock-fighting, carried on in licensed cockpits, which yield a large revenue to the government, and betting and gambling. Almost the only industry is the manufacture of cigars, which employs 21,000 women and 1500 men. The harbour is not very safe during south-west and north-east winds, although shelter is afforded by a small breakwater, and improvement works were in operation for ten

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years until suddenly stopped in 1889. Large ocean-going vessels anchor at the naval station of Cavite, 2 miles to the south-west. A railway was commenced from Manila to Dagupan, a distance of 120 miles, in 1887, and one section was opened in 1890. The principal port of the Philippines, Manila has an export trade valued approximately at £3,400,000 annually, and an import trade that falls but little short of that figure. Sugar, hemp, cigars and tobacco, and coffee account for three-fourths of the exports, and cotton goods, rice, wine, silk, and flour figure most prominently amongst the imports. Nearly one-half of the trade is carried on under the British flag, one-fourth under the Spanish, and one-seventh under that of the United States. The Spanish authorities are very jealous of foreigners settling in Manila, and especially dislike the Chinese. A breach was threatened in 1889 between China and Spain on account of the treatment to which the subjects of the former power were subjected in the Philippines.—For *Manilla Hemp*, see ABACA.

Manin, DANIELE, an Italian patriot of Jewish descent, was born 13th May 1804 at Venice, studied law at Padua, and subsequently practised at the bar. From 1831 he became a recognised leader of liberal opinion in Venice. Previous to the outbreak of 1848 Manin was imprisoned for presenting a somewhat outspoken petition to the authorities; but on the promulgation of the news that Paris, Naples, and Tuscany were in revolution he was released in triumph by the populace, and was at once invested with supreme power. From the period of his election to the presidency of the Venetian republic Manin's energies were devoted to the organisation of the inhabitants for self-defence. During the annexation of Lombardy to Piedmont he laid down his authority; but on the defeat of the Sardinian army at Novara, 23d March 1849, he resumed it, and was the animating spirit of the entire population of Venice during the heroic defence of the city for five months against the besieging Austrian army. On the 24th of August Venice capitulated; but Manin, with forty of the principal citizens, being excluded from the amnesty, quitted the city. He retired to Paris, where he taught Italian, and where he died of heart-disease, 22d September 1857. The bones of this truly great and noble man were brought to free Venice in 1868, and a statue of him was erected in 1875. See Lives by Henri Martin (Paris, 1859), Finzi (1872), and Errera (1875).

Manioc, MANDIOC, or CASSAVA (*Manihot utilissima*), a plant of the natural order Euphorbiaceæ, a native of tropical America, and much cultivated there, in tropical Africa, and in other tropical countries. Manioc, or *Mandioca*, is the Brazilian name, *Cassava* the West Indian; and in Peru and some other parts of South America the name is *Juca* or *Yucca*. The plant is shrubby, with brittle stems 6 to 8 feet high, and crooked branches, at the extremities of which are the large palmate leaves and green flowers. The root is tuberous, of immense size, weighing often as much as 30 lb. The milky, acrid juice which permeates every part of the plant is a deadly poison in its fresh state, owing to the presence of hydrocyanic acid, which is quickly dissipated by heat. The juice, inspissated by boiling, forms the excellent sauce called *Cassareep* (q.v.), and fermented with molasses yields an intoxicating beverage called *Ouycou;* whilst the root, grated, dried on hot metal plates, and roughly powdered, becomes an article of food, largely used in South America, and there very generally known as *Farina* (Port., 'meal'). It is made into thin cakes, like the oatmeal-cakes of Scotland, which are formed, however, not by mixing it with water, but by the action of heat softening and agglutinating the particles of starch. It is also imported into Britain, to be used in manufactories as starch. The true starch of manioc, separated in the ordinary manner from the fibre, is known in commerce as *Brazilian Arrowroot*. From it tapioca is made, by heating it on hot plates, and stirring with an iron rod; the starch-grains burst, some of the starch is converted into dextrine, and the whole agglomerates into small irregular masses. The *Pearl Tapioca* of the shops, consisting of small spherical grains, is not a product of manioc but of potato starch.—Another species or variety of manioc is also cultivated, the roots of which contain a perfectly bland juice, and are eaten raw, roasted, or boiled. This, the Sweet Cassava or Sweet Juca (*M. Aipi*, said to be a native of Africa as well as of America), has the root of longer shape than the common or bitter cassava, and smaller.—The manioc is easily propagated by cuttings of the stem, and is of rapid growth, attaining maturity in six months. The produce is at least six times that of wheat.

Manipur, a native state in the north-east of India, occupying some 8000 sq. m. of for the most part heavily timbered mountain-land between Burma, Assam, Chittagong, and Cachar; pop. (1881) 221,070, collected most thickly in one valley, 650 sq. m., situated 2500 feet above sea-level. Most of the work in the country is performed by women: they do all the buying and selling, and the carrying to and from market, as well as the field labour and the spinning and weaving. The men are incorrigibly lazy, but passionately fond of the game of Polo (q.v.). A British political agent is stationed at the rajah's court; but no tribute is paid to the British government.—The *capital*, called Manipur, also Imphail, is a vast group of suburban residences, those of the rajah and his courtiers, situated in the midst of a large forest. The place has no tradesmen or artisans; its wants are supplied by women hucksters, who bring in food and cloth from their villages. Pop. 30,000 to 40,000.

Manis. See PANGOLIN.

Manissa. See MAGNESIA.

Manistee', capital of Manistee county, Michigan, is on Lake Michigan, at the mouth of the Manistee River, 135 miles NW. of Lansing. It has several foundries, ten salt-works, and a large number of lumber-mills. Pop. (1890) 12,799.

Manitoba, a province of Canada, bounded on the W. by the district of Assiniboia, and on the NW. and N. by the districts of Saskatchewan and Keewatin. Its eastern boundary is the province of Ontario and the unorganised territory east of Keewatin. On the S. the boundary is 49° N. lat. The province is traversed by several rivers, among others the Assiniboine, with its many tributaries, the chief of which are the Souris, the Pembina, and the Red River. The Winnipeg River flows for 60 or 70 miles through the eastern portion of the province into Lake Winnipeg. The principal lakes are Winnipeg, 8500 sq. m.; Manitoba, 1900 sq. m.; and Winnipegosis, 1936 sq. m. The country consists for the most part of a level plain, with occasional undulations. A good deal is said from time to time about the severity of the climate. The summer mean is 65° to 70°—nearly the same as that in the state of New York. In winter the thermometer occasionally sinks to 30°, 40°, and 50° below zero; but these extreme temperatures are very rare. The atmosphere is bright and dry, and the cold is not so much felt as in many countries with a higher temperature and a more humid atmosphere. Warm clothing—especially when driving—and warm houses are necessary to resist the severity of the weather. Very little snow falls on

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the prairies, the average depth being about 18 to 24 inches; the native horses graze out of doors all the winter. Ploughing generally begins during April. The harvest takes place in August and September. Trees are found along the rivers and streams, and in greater abundance in the eastern and northern parts of the province; but Manitoba is not well wooded.

The population in 1886 was 108,640—Presbyterians, 28,406; Church of England, 23,206; Methodists, 18,617; Roman Catholics, 14,651; Mennonites, 9112. Ethnologically they may be classified as follows: of English origin, 25,949; Irish, 21,180; Scotch, 25,676; Indians, 5575; half-breeds, 7985; French, 6821; Germans, 11,082; Icelanders, 2468. Among the principal cities and towns are Winnipeg, 25,000; Portage-la-Prairie, 4000; Brandon, 4000; and Selkirk, 1000. The chief industry is agriculture; the soil is of remarkable depth and fertility, and in favourable seasons the crops are large, considering the imperfect methods of cultivation practised. Manitoba wheat and flour are regarded as the finest in the continent. Much of it is bought up by American millers, the product being mixed with flours made from grain produced in the United States. Other grains succeed admirably, and an endeavour is being made to encourage the growth of flax. Vegetables and roots are unusually prolific and of great size. Wheat-growing was for some few years the staple industry; but the farmers are now engaged more in mixed farming, including dairy-farming and the raising of cattle and sheep. Fruit-growing is not carried on to any extent, although many of the smaller varieties—such as the strawberry, black and red currant, raspberry, gooseberry, and cranberry—appear to be indigenous. In minerals the province is not very rich, but coal is found in southern Manitoba, although it is not yet worked to any extent. Manufactures of various kinds are increasing; and Winnipeg is to a large extent the distributing centre for the western part of the Dominion. Big game is still found in the less accessible parts of the province—moose, bear, and some kinds of deer. Small game is plentiful—principally prairie chicken and wild duck. Close times are provided for the protection of all the principal wild animals and birds. A considerable fishing industry is carried on in the rivers and lakes, and white-fish and pickerel are caught in large quantities.

Goods to the value of $2,207,314 were imported in the year ending June 1889. Of this amount $673,012 came from Great Britain, and $1,434,749 from the United States; the other countries being in the following order: Japan, France, Germany, China, and Belgium. The exports in the same period were valued at $1,782,606, consisting chiefly of animals and their produce, and agricultural products, chiefly to Great Britain and the United States. These figures do not include the inter-provincial trade, which is large.

The government is administered by a lieutenant-governor, appointed by the governor-in-council. He is assisted by an Executive Council and a Legislative Assembly of 35 members elected by the people. There is only one House of Parliament in Manitoba. The province is represented by three members in the Dominion Senate and by five in the House of Commons. The revenue of the province in 1888 was $1,740,448, and the expenditure $991,221. The subsidies from the Dominion treasury amounted in all to $426,671.

In Manitoba the Dominion government offers free grants of land—160 acres—to every male settler above eighteen years of age, and to every female who is the head of a family. There is still a considerable quantity of government land undisposed of in the north-western and north-eastern parts of the province. The Canadian Pacific Railway Company, the Canada North-west Land Company, the Manitoba and North-western Railway Company, and the Hudson Bay Company have a considerable quantity of land for sale in different parts of the province, the price ranging from $2.50 up to $7 or $8 per acre, according to locality and contiguity to railways and settlements. A large land grant has also recently been promised to the Hudson Bay Railway Company. Improved farms are to be had on reasonable terms at moderate prices. The Dominion Lands Commissioner is established in Winnipeg, and there are land and immigration agents in different parts of the province.

Manitoba is in communication by rail with the Atlantic seaboard and the Pacific, and with all parts of Canada and the United States. The construction of the Canadian Pacific Railway—completed in 1885—has naturally been of immense advantage to the province. The first railway to Manitoba was a continuation of the United States system from Pembina to Winnipeg, and was opened in 1879. The Northern Pacific Railway has direct connection with Winnipeg and Brandon; and a railway is projected from Winnipeg to Hudson Bay.

Until 1868 what is now known as Manitoba formed a portion of the territory under the control of the Hudson Bay Company. The first agricultural settlement in the country was formed in 1812, under the auspices of the Earl of Selkirk, who took out a party of Highlanders in that year. They were located at Kildonan and Selkirk, on the Red River, about 20 miles north of the site of the present city of Winnipeg. In 1868 the company gave up their exclusive rights to the government of the territory, on certain conditions—among others a money payment of £300,000 and a considerable grant of land. The province of Manitoba was constituted by an Act passed in 1870. One of the first events of importance that happened in Manitoba was the Riel rebellion in 1869–70. It arose out of a feeling of some of the inhabitants that their position and rights had not been sufficiently considered in the transfer already mentioned. The rebellion collapsed in 1870 on the arrival at Fort Garry, the site of the present city of Winnipeg, of the expedition under Colonel (afterwards Lord) Wolseley. Most of the leaders in the rebellion were subsequently amnestied. The progress of Manitoba from an agricultural point of view has been somewhat remarkable, but its political history has been comparatively uneventful, excepting for the existence of occasional friction between the provincial and Federal authorities since 1880, in connection with railway extension in the province. After protracted negotiations these differences have, however, been disposed of.

References may be made to the following works: Bryce's *Manitoba: Its Infancy, Growth, and Present Condition* (1882); Christie's *Manitoba Described* (1885); Macoun's *Manitoba and the Great North-west* (Lond. 1883); Grant's *Ocean to Ocean* (1873); Fream's *Canadian Agriculture* (1885); *Official Handbook to Canada* (Lond. 1890); Haydon and Selwyn's *North America* (1883); *A Canadian Tour* (1886); *The Statistical Year-book of Canada* (Ottawa, 1890).

Manitou. See ANIMAL-WORSHIP, Vol. I. p. 288.

Manitou, a summer-resort at the base of Pike's Peak, Colorado, 6296 feet above the level of the sea. It is the Saratoga of the west, with soda springs and several large summer hotels. Pop. 422.

Manitoulin Islands, a chain of islands in Lake Huron, separating it from Georgian Bay. The principal are Grand Manitoulin (80 miles long

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and 28 wide), Cockburn Isle, and Drummond Isle; the last belongs to the state of Michigan, the rest to Ontario. All are irregular and striking in their natural features, and Grand Manitoulin and Cockburn are covered with large forests of pine. Pop. about 2000.

Manitowoc', capital of Manitowoc county, Wisconsin, lies at the mouth of the Manitowoc River, on Lake Michigan, 77 miles by rail N. of Milwaukee. It has a good harbour, and shipbuilding is actively carried on. Lumber is sawn, and furniture, machinery, castings, and leather are manufactured. Pop. (1885) 6881.

Manka'to, capital of Blue Earth county, Minnesota, on the right bank of the Minnesota River, 86 miles SW. of St Paul. Three lines of railway pass, and small steamboats can ascend as far as this point. The town contains a state normal school, Roman Catholic college, &c., and has varied manufactures. Pop. (1885) 7845.

Mann, HORACE, American educationist, was born at Franklin, Massachusetts, 4th May 1796, graduated at Brown University in 1819, and commenced the study of law. He was elected to the legislature of Massachusetts in 1827, and succeeded in founding the state lunatic asylum. Removing to Boston, he was elected (1833) to the state senate, of which he became president. After editing the revised statutes of the state, he was for eleven years secretary of the Board of Education. He gave up business and politics, and devoted his whole time to the cause of education, working usually fifteen hours a day. In 1843 he made a visit to educational establishments in Europe, and his Report was reprinted both in England and America. In 1848 he was elected to congress, as the successor of John Quincy Adams, whose example he followed in energetic opposition to the extension of slavery. In 1853 he accepted the presidency of Antioch College, at Yellow Springs, Ohio, established for the education of both sexes, where he laboured with zeal and success until his death, August 2, 1859. See the Life by his wife (1865; new ed. 1882).

Manna, a concrete saccharine exudation obtained by making transverse incisions into the stems of cultivated trees of *Fraxinus Ornus*. The manna ash is cultivated chiefly in Sicily and Calabria for the purpose of obtaining manna. In July or August the collectors make deep cuts through the bark to the wood near the base of the tree; and if the weather be warm and favourable, the manna begins to ooze out of the cuts slowly, and hardens in lumps or flakes, which are from time to time removed by the collectors. Manna is a light porous substance, usually in stalactiform pieces, 1 to 6 inches long, crystalline, friable, yellowish in colour, with a honey-like odour and a sweetish, somewhat bitter taste. It is used in medicine as a gentle purgative for young children. It consists of about 60 to 80 per cent. of mannite, about 10 per cent. moisture, a bitter substance, and other less important constituents. There are several other manna-yielding plants besides the ash, especially the manna-bearing Eucalyptus of Australia (*Eucalyptus mannifera*), which is non-purgative, and is a favourite sweetmeat with the children of that country. Small quantities are found on the common larch in some districts; this kind is known under the name of manna of Briançon.

The manna of the Israelites, which they ate during their wanderings in the wilderness, was identified by Ehrenberg with the saccharine substance called *Mount Sinai Manna*, which is produced in that region by a shrub, *Tamarix mannifera*, a species of Tamarisk (q.v.), from the branches of which it falls to the ground. It does not, however, contain any mannite, but consists wholly of mucilaginous sugar. The exudation which concretes into this manna is caused by the punctures made in the bark by insects of the genus Coccus (*C. manniparus*), which sometimes cover the branches. It is a kind of reddish syrup, and is eaten by the Arabs and by the monks of Mount Sinai like honey with their bread. Others have supposed that the manna of the Jews was produced by a species of Camel's Thorn (q.v.).

Manners, a noble family of Northumbrian extraction, their ancestor, Henry de Maners, having in 1178 been lord of the manor of Ethale, or Etal, in that county. His descendant, Sir Robert de Manners, was governor of Norham Castle in 1327. In 1454 another Sir Robert de Manners was sheriff of Northumberland; in 1525 his grandson was raised to the earldom of Rutland; and in 1703 the tenth earl was raised to the dukedom. The eldest son of the third duke was the celebrated Marquis of Granby (q.v.). The chief seat of the family is Belvoir Castle, 7 miles W. by S. of Grantham, a large castellated pile, reconstructed by Wyatt, and commanding a splendid view. Crabbe was chaplain here. See works by Eller (1841) and Allen (1874).

Mannheim, the capital formerly of the Rhenish Palatinate, and now the chief trading-town in Baden, lies low in a fertile plain on the right bank of the Rhine, here 400 yards wide and joined by the Neckar, 53 miles S. of Frankfort and 38 N. of Carlsruhe. The fortifications have been converted into gardens, and the town is remarkable for its cleanliness and regularity, the whole of it being laid out in quadrangular blocks. The palace, built in 1720–29 by the Elector-Palatine Charles Philip, is one of the largest in Germany, covering 15 acres, with a façade 580 yards long, and 1500 windows. The Schillerplatz is adorned with colossal statues of Schiller, Dalberg, and the actor and dramatist Iffland (1759–1814). A great and increasing river-trade is carried on, the harbour having been opened in 1875. The manufactures also are important, of iron, cigars, carpets, india-rubber, &c. Pop. (1875) 46,453; (1885) 61,273, of whom 26,904 were Catholics, and 4249 Jews. Mannheim is heard of as early as 705, but remained a mere village till 1606, when a castle was built by the elector-palatine, around which a town grew up, peopled chiefly by Protestant refugees from the Low Countries. It was several times taken and retaken during the wars of the 17th century, totally destroyed by the French in 1689, rebuilt and strongly fortified, and in 1795 severely bombarded by the Austrians. See works by Fecht (1864) and Feder (1875–77).

Manning, HENRY EDWARD, a cardinal of the Catholic Church, was born 15th July 1808, at Totteridge in Hertfordshire, was educated at Harrow and Balliol College, Oxford, and, after taking a double first in 1830, was made a Fellow of Merton. He soon came to the front as an eloquent preacher and as a leader of the Tractarian party. In 1834 he was appointed to a country rectory in Sussex, and married a lady whose sisters were the wives of Samuel and Henry Wilberforce. Mrs Manning died after a few months of married life. In 1840 her husband became Archdeacon of Chichester. But in 1851, deeply moved by the final decision in the 'Gorham Case' (q.v.), he left the Church of England and joined the Church of Rome. His advancement in that communion was rapid from the first; having been ordained priest, he studied for some years in Rome, and in 1857 he founded the congregation of the Oblates of St Charles Borromeo at Bayswater, London. He was made provost of Westminster, and in 1865, on the death of Cardinal Wiseman, was promoted to be Archbishop of Westminster. At the Œcumenical Council of

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1870, Manning was one of the most zealous supporters and promoters of the infallibility dogma; and, named cardinal in 1875, he has continued an influential leader of the Ultramontane section of the church. Besides being the foremost spirit in most Catholic movements in England, he has taken part in many non-sectarian good works designed to better the social life of the people, such as the temperance movement; and he was a member of the Royal Commissions on the Housing of the Poor (1885) and on Education (1886). Thus he is not only a devout prelate and a churchly statesman, he is also a practical reformer; and to these characters he adds that of an accomplished man of the world. Before his secession to Rome, he published several volumes of powerful sermons; since then, his writings have been mainly polemical. Amongst his numerous volumes, pamphlets, and articles are discussions of the temporal power of the pope, infallibility, the Vatican Council, Ultramontanism, the *Four Great Evils of the Day* (2d ed. 1871), *Internal Mission of the Holy Ghost* (1875), *The Catholic Church and Modern Society* (1880), *Eternal Priesthood* (1883), *Characteristics* (ed. by W. S. Lilly, 1885), &c.

Manning, ROBERT. See BRUNNE, ROBERT DE.

Mannite, $C_6H_8(OH)_6$, is a peculiar saccharine matter which forms the principal constituent of Manna (q.v.); it is also found in several kinds of fungi, in asparagus, celery, onions, &c. It is most readily obtained by digesting manna in hot alcohol.

Manoa. See EL DORADO.

Man-of-war. See NAVY.

Man-of-war Bird. See FRIGATE BIRD.

Manometer (Gr. *manos*, 'thin,' 'rare') is properly an instrument for measuring the rarity of the air or of other gases; but the name is most frequently applied to instruments for indicating the elastic pressure of gases, which is always, for each kind of gas, inversely proportional to its rarity, or directly proportional to its density. The several kinds of Barometers (q.v.) are really manometers, and so is the steam-gauge of a Steam-engine (q.v.).

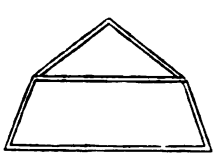
Manor, in English law, denotes the land held by a body of tenants under one seignory or lordship. Manors were probably formed by the gradual establishment of feudal rights over free townships and subject communities of villeins or serfs; but, according to legal theory, the lord derives his rights from the king or from some superior lord. In a fully-organised manor the local customs are enforced by three courts: a Court Baron for the free tenants, who are emphatically the *barones* or men of the manor; a Customary Court for the copyholders, who hold by base or customary tenure; and a Court Leet, in which officers are elected and minor offences punished. The lord's demesne includes lands occupied by himself and by his tenants-at-will, including customary tenants. Freehold lands do not form part of the lord's demesne; but free tenants are essential to the existence of a manor. Where the services of free tenants have been allowed to pass into desuetude, the manor survives as a 'manor by reputation,' but the Customary Court is kept alive for the purpose of recording acts and events which affect the title to copyhold lands, and of collecting the quitrents, fines, &c., which are payable to the lord. No new free tenure can be created in England since the statute *Quia Emptores*, passed in 1290; all existing manors, therefore, must trace their origin from before that time. The king himself was lord of many manors in right of his crown; and these are called manors of ancient demesne, to distinguish them from lands which fell casually into the king's hands by forfeiture or otherwise. Manors closely resemble the feudal estates known to the law of Scotland. In the United States there is no institution corresponding to the manor. See FEUDALISM.

Manrent (or properly, MANRED), BONDS OF, agreements which used to be entered into in the Highlands of Scotland between the greater and lesser magnates, where protection on the one hand was stipulated in return for allegiance on the other.

Manresa, a town of Spain, on the Cardoner, 41 miles by rail NW. of Barcelona. It has a fine church (1020–15th century), the cave of Ignatius Loyola, and manufactures of cotton, broadcloths, brandy, &c. In 1811 it was fired by Marshal Macdonald—an outrage avenged by the Catalan knives of the townsfolk. Pop. 16,526.

Mans, LE, a picturesque city of France, the capital formerly of the province of Maine, and now of the department of Sarthe, on the left bank of the river Sarthe, 132 miles SW. of Paris by rail. The cathedral, 390 feet long, has a Romanesque nave of the 11th and 12th centuries, and a matchless Pointed-Gothic choir of the 13th century, 104 feet high, with splendid stained glass. In the right transept is the monument of Berengaria, Cœur-de-Lion's queen. There are two other interesting churches, and both préfecture and seminary occupy old conventual buildings, the former comprising also a museum and a library of 55,000 volumes. Le Mans does a large trade in poultry and clover-seed, and manufactures candles, woollens, lace, soap, &c. Pop. (1872) 42,654; (1886) 53,468. The *Cenomanum* of the Romans, and the birthplace of Henry II. of England, Le Mans witnessed in 1793 the dispersion and massacre of more than 10,000 Vendéans; and in January 1871 the defeat, after a stubborn resistance, of 100,000 Frenchmen under Chanzy by Prince Frederick-Charles. A statue of Chanzy was erected in 1885, and one of Belon (q.v.) in 1887. See Hublin, *Le Mans Pittoresque* (1885).

Mansard Roof, a form of roof invented by François Mansart (1598–1666), a distinguished French architect. It is constructed with a break in the slope of the roof, so that each side has two planes, the lower being steeper than the upper. The framework ought to be arranged so that its parts are in equilibrium. This kind of roof has the advantage over the common form of giving more space in the roof for living-rooms.



Mansard Roof.

Manse, in Scotch law, is the designation of a dwelling-house of the minister of the Established Church, and in popular use the term is often applied generally to the dwelling-house of any minister of a dissenting congregation, though no legal right exists in the latter case. In the Established Church every first minister of a rural parish is entitled to a manse, which the heritors or landed proprietors in the parish are bound to build and uphold; and he is also entitled, as part of the manse or dwelling-house, to a stable, barn, and byre. The manse must, by statute, be near to the church. When a manse has been built or repaired by the heritors it becomes a free manse, and all ordinary repairs have to be done at the charges of the minister. Decree to the effect that a manse is 'free' may be given by the sheriff; and such decree stands good for fifteen years, or until the appointment of a new minister. It has been judicially decided that a minister has a right to let his manse at a rent for two months in summer.

Mansel, HENRY LONGUEVILLE, Dean of St Paul's, was born at Cosgrove rectory, Northamp-

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tonshire, October 6, 1820. Educated at Merchant Taylors' School and St John's College, Oxford, he became Reader in Moral and Metaphysical Philosophy in 1855, and Waynflete professor in 1859. Appointed regius professor of Ecclesiastical History, and canon of Christ Church, Oxford, in 1867, he was made Dean of St Paul's in 1869. He died 31st July 1871. The pupil and continuator of Hamilton (q.v.), he differed from him in holding that there is immediate cognition of the conscious ego; and he went beyond his master in emphasising the relativity of knowledge in the province of theology—alleging that we have no positive conception of the attributes of God (see CONDITION). The agnostic tendency of this doctrine created violent controversy. His published works are Aldrich's *Logic*, with Notes (1849); *Prolegomena Logica* (1851); article 'Metaphysics' in 8th edition of the *Encyclopædia Britannica* (1857), afterwards published separately; *The Limits of Religious Thought* (Bampton Lectures, 1858); *The Philosophy of the Conditioned* (1866), in reply to Mill's *Review of Hamilton's Philosophy*; and lectures on *The Gnostic Heresies*, edited by Lightfoot in 1874, with Life of Mansel by the Earl of Carnarvon. He was co-editor, with Professor Veitch, of Sir William Hamilton's Lectures. See Dean Burgon's *Lives of Twelve Good Men* (1888).

Mansfeld, COUNTS OF, an old German noble family (founded *circa* 1060), whose ancestral castle stood at the east end of the Harz Mountains, 14 miles NW. of Halle. Two members of the family have acquired historical reputation. COUNT PETER ERNEST I., afterwards elevated to the rank of a prince, was born on 15th July 1517. Having taken part in Charles V.'s expedition against Tunis, and distinguished himself afterwards at the siege of Landrecies, he was made by the emperor governor of the duchy of Luxemburg. But in 1552, whilst raiding in Champagne, he was taken prisoner by the French, and not ransomed until 1557. He fought against them again at St Quentin. On the outbreak of the revolt in the Low Countries he made a name as one of the cleverest generals in the Spanish service. Having been sent by Alva to the assistance of the French king against the Protestants, he covered himself with glory at Moncontour (1569). He subsequently took part in many sieges and military operations in the Netherlands, and acted for a while as governor of the Spanish Low Countries. In 1597 he retired to Luxemburg, where he had gathered a valuable collection of antique art, and died there on 22d May 1604.

His illegitimate son, PETER ERNEST II., usually called Count Ernest von Mansfeld, was one of the most prominent military leaders during the Thirty Years' War (q.v.). Born at Luxemburg in 1580, he served his apprenticeship to war in the Austrian service in Hungary and in the Juliers dispute. As part of his reward he was promised his father's possessions; but when it came to the pinch, they were refused to him. This converted Mansfeld into an implacable enemy, and he went over to the side of the Protestant princes. He assisted the Duke of Savoy against the Spaniards (1613–17), and in 1618 was despatched to Bohemia, to aid the Count-Palatine Frederick, and captured Pilsen and other strongholds. But the disaster of the Weissenberg compelled him to retreat to the Palatinate, from which he carried on for nearly two years a semi-predatory war on the imperialists, defeating Tilly at Wiesloch (April 1622). When Frederick abandoned the struggle, Mansfeld, with his chosen ally Christian of Brunswick, a swashbuckling adventurer like himself, fought his way through the Spanish-Austrian forces to take service for the United Netherlands, beating Cordova at Fleurus (29th August). At the bidding of his new masters Mansfeld chastised the Count of East Friesland, and then, dismissing his army, retired into private life at The Hague. But in 1624 he resumed active work again at the solicitation of Richelieu. With an army of 12,000 men, raised mostly in England, he renewed the struggle on the Lower Elbe, till on 25th April 1626 he was crushingly defeated by Wallenstein at the bridge at Dessau. Once more raising a force of 12,000 in Brandenburg, with these and 5000 Danes he marched by way of Silesia to join hands in Moravia and Hungary with Bethlen Gabor of Transylvania. But the French and English subsidies failing, on which he relied for pay for his men, he was making his way to Venice with a few officers to raise fresh moneys when he fell sick and died, standing, clad in full panoply and supported by two attendants, at Racowitza, near Serajevo in Bosnia, on 29th November 1626. Count Ernest, a soldier of fortune, was the idol of his lawless soldiery, whom he frequently allowed to plunder and raid to their heart's content, so that they were a terror to friends as well as foes.

Mansfield, a market-town of Nottinghamshire, in Sherwood Forest, 17 miles N. of Nottingham. Its grammar-school (1561) has been rebuilt at a cost of £10,000; and there are a memorial cross (1850) to Lord George Bentinck, a town-hall (1836), an interesting parish church, &c. Mansfield stands in the centre of a manufacturing and mining district, and has manufactures of lace-thread and iron. Pop. (1851) 10,012; (1881) 13,651. See Harrel's *History of Mansfield* (1801).

Mansfield, capital of Richland county, Ohio, stands on an elevated site, 179 miles by rail NE. of Cincinnati, and contains iron-foundries and manufactories of flour, agricultural implements, stoves, tiles, &c. Pop. 9859.

Mansfield, WILLIAM MURRAY, EARL OF, Lord-chief-justice of the King's Bench, was the fourth son of Andrew, Viscount Stormont, and was born at Perth, 2d March 1704. From Westminster he passed to Christ Church, Oxford, graduated M.A. in 1730, and was called to the bar the following year. He soon acquired an extensive practice—mainly, it would seem, on account of his facility and force as a speaker, for neither then nor at any subsequent period of his career was he reckoned a very erudite lawyer—and was often employed on appeal cases before the House of Lords. In 1743 he was appointed Solicitor-general, entered the House of Commons as member for Boroughbridge, and at once took a high position. In 1746 he acted, *ex officio*, as counsel against the rebel lords, Lovat, Balmerino, and Kilmarnock; was appointed Attorney-general in 1754; and at this time stood so high that, had not the keenness of his ambition been mitigated by a well-founded distrust of his fitness for leading the House, he might have aspired to the highest political honours. He became Chief-justice of the King's Bench in 1756, and, contrary to usage, also a member of the cabinet; and entered the House of Lords under the title of Baron Mansfield of Mansfield, in the county of Nottingham. Although he was impartial and tolerant as a judge, his opinions were not those of the popular side, and accordingly he was exposed to much abuse and party hatred. Junius bitterly attacked him, and during the Gordon riots of 1780 his house, with all his books and papers, was burned. The aged judge declined with much dignity to be indemnified by parliament. In 1776 Murray was made Earl of Mansfield. Age and ill-health forced him to resign the Chief-justiceship in 1788. He died,

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20th March 1793, when the title devolved upon his nephew, Viscount Stormont.

Mansion House, the official residence of the Lord Mayor of London, was built on the site of the Old Stocks Market in 1739, at a cost of £42,638. It is an oblong building, and at its farthest end is the Egyptian Hall. Four hundred guests can dine in this grand banqueting-room, which was designed by the Earl of Burlington from the description of an Egyptian chamber given by Vitruvius. All the great banquets, public and private, given by the Lord Mayor take place here, and there are also fine ball and reception rooms. At the close of the exhibition of 1851 the Corporation of London voted £10,000 to be expended on statuary for the adornment of the Mansion House; and there is also a fine gallery of portraits and other pictures. Among its curiosities may be mentioned a state bed, which cost 3000 guineas, and a kitchen and culinary utensils extraordinary for their vast size. The Lord Mayor's jewelled collar of gold and diamonds, his silver-gilt mace, his sword, and his seal are described, together with his coach and ancient barge, in Thornbury's *Old and New London*, vol i. pp. 436, 443. The establishment and expenses connected with the office cost an annual sum of £25,000; and it is said that only one Lord Mayor ever saved anything out of his salary. The Mansion House is too modern to possess much historical interest; but the Wilkes riots frequently took place in its neighbourhood during the mayoralty of Wilkes' friend, Brass Crosby. The Mansion House is often a centre of benevolent enterprise in the collection of money for sufferers by war, famine, flood, pestilence, and earthquake abroad, or by colliery explosions, shipwrecks, and lack of employment at home; and Mansion House Funds are also raised for memorials to heroic worth.

Manslaughter is the crime of unlawful homicide without malice aforethought. Homicide, or the infliction of death, is not a crime when it is done in self-defence against unlawful violence, or when it is done in the execution of the sentence of a court of justice. Thus one whose life is endangered by the violent attack of a madman, and kills the madman, commits homicide, but is innocent of manslaughter. So, too, is the executioner who hangs a convicted murderer. Homicide is unlawful, and amounts to manslaughter when, without being justified in any such manner as has been exemplified above, it is committed with the intention to cause physical injury; or is the result of culpable negligence or omission to perform some legal duty; or is the result of an accident occasioned by some unlawful act. Thus, if one man strike another without intending to kill him, and the blow prove fatal, the striker is guilty of manslaughter; or if, where it is the duty of the master of a ship to keep a lookout for small boats in the ship's way, a boat is run down and its occupants drowned in consequence of the absence of a lookout upon the ship, the master of the vessel is guilty of manslaughter; or if a man is engaged in an unlicensed manufacture of dynamite, and by an accidental explosion of the dynamite another is killed, the manufacturer is guilty of manslaughter. When manslaughter is accompanied by malice aforethought, it becomes murder. See Sir James Stephen's *Digest of the Criminal Law*.

Manson, GEORGE, a Scottish water-colour painter, was born in Edinburgh on 3d December 1850. He served five years as a wood-engraver in the establishment of Messrs W. & R. Chambers, studying art in his spare hours morning and evening. His first picture which attracted attention, 'Milking Time,' was painted at Craigmillar Castle near Edinburgh, between four and eight o'clock of the mornings of a whole summer. In 1871 he devoted himself to painting altogether, but his youthful hard study had permanently injured his health, and he died at Lympstone, Devonshire, 27th February 1876. His pictures, which have increased largely in value since his death, are mostly from humble life; beauty and refinement of drawing and colour are their great charm. A memoir of him, with photographs of his principal pictures, was published in 1880. See also P. G. Hamerton's *Graphic Arts*, p. 311.

Mansourah, a town of Lower Egypt, on the Damietta branch of the Nile, 30 miles SW. of Damietta by rail. Pop. (1882) 26,942. The place was founded in 1220, and here St Louis of France was imprisoned in 1250.

Mant, RICHARD (1776–1848), divine, was born in Southampton, educated at Oxford, and after holding cures in England, became successively Bishop of Killaloe (1820) and of Down and Connor (1828), with Dromore attached (1842). He wrote with D'Oyly a famous annotated Bible (1814), an annotated *Book of Common Prayer* (1825), and a *History of the Church of Ireland* (1841). See his *Memoirs* by Berens (1849) and W. Mant (1857).

Mantchuria. See MANCHURIA.

Mantegna, ANDREA, Italian painter, born in or near Padua in 1431, was the favourite pupil and adopted son of that tailor Mæcenas of painters, Squarcione. By studying the antique collections gathered together by his patron, especially from the study of the sculpture, Mantegna became imbued with the spirit of ancient art, and all his works bear the impress of the severe dignity and precision of his models. Grace and beauty were not the ideals that he aimed at; some of his pictures are positively ugly. A precocious genius, Mantegna set up an independent atelier when only seventeen years of age. Amongst his earliest works, done at Padua, are frescoes of saints in the church of St Antony, an altarpiece for St Justina, and most of the frescoes of St Christopher, and some of those of St James, in the church of the Hermits. Having married the sister of Giovanni and Gentile Bellini, he seems to have become estranged from Squarcione, and left Padua (1459). He painted an altarpiece, the 'Madonna and Angels,' for St Zeno's church at Verona, and was induced by Lodovico Gonzaga, Duke of Mantua, to settle in his city. There he remained, with the exception of a visit to Rome (1488–90) to paint a series of frescoes (now destroyed) for Pope Innocent VIII., until his death on 13th September 1506. His greatest works at Mantua were nine tempera pictures representing the 'Triumph of Cæsar' (his masterpiece). 'The Madonna of Victory with Gonzaga,' 'Parnassus,' 'Defeat of the Vices,' 'Triumph of Scipio,' and 'Madonna between St John the Baptist and St Magdalene.' Like Leonardo da Vinci, Mantegna was something of a universal genius. He was an engraver and an architect, as well as a painter, and is said to have written poems and wielded the sculptor's chisel. He introduced into North Italy, though he can hardly have invented, the art of engraving with the burin on copper. His best plates bear the titles 'A Bacchanal Feast,' 'Descent from the Cross,' 'Entombment,' 'Resurrection,' 'Battle of the Titans,' and 'Roman Triumphs.' Mantegna's technical excellencies, his skilful foreshortening, masterly perspective, and austerity of form exercised a great influence upon subsequent Italian art.

Mantell, GIDEON ALGERNON, an eminent British palæontologist and geologist, was born at Lewes, in Sussex, in 1790; studied medicine, and practised successively at Lewes, Brighton, and

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Clapham, London, where he died in 1852. Though long suffering from a distressing spinal disease, the result of an accident, he pursued his studies with unabated zeal. He bequeathed his geological drawings to Yale College. His collections he sold to the British Museum in 1839 for £5000. Mantell's principal works are *Fossils of the South Downs* (1822); *The Fossils of Tilgate Forest* (1826); *Wonders of Geology* (1833), perhaps the most popular geological work ever written by an Englishman; and *Medals of Creation, or First Lessons in Geology* (1844). He was a very voluminous writer, no less than sixty-seven works and memoirs of his being enumerated in Agassiz and Strickland's *Bibliotheca Zoologiæ et Geologiæ*. His claims to a permanent place in the history of science rest mainly on his laborious investigations into the fossils of the Wealden beds. To him we owe the discovery and description of the four great Dinosaurian reptiles, the *Iguanodon*, *Hylæosaurus*, *Pelorosaurus*, and *Regnosaurus*.

Mantes, a town in the French department of Seine-et-Oise, on the left bank of the Seine, 36 miles by rail WNW. of Paris. It has a striking tower (1344) and a beautiful church, a reduced copy of Notre Dame at Paris. The ancient *Medunta*, a town of the Celts, Mantes in 1083 was sacked by William the Conqueror, who here received the injury that caused his death; and here too Henry IV. was converted from Protestantism. Pop. 6607.

Manteuffel, Edwin Hans Karl, Freiherr von, Prussian general and administrator, was born, of an old Pomeranian noble family, at Dresden on 24th February 1809. Entering the Prussian guards in 1827, he rose to be colonel by 1854, and three years later was nominated head of the military bureau at Berlin, a post which he held until 1865. Having been appointed commander of the Prussian troops in Sleswick, he protested against the summoning of the Holstein estates by marching his men into that duchy (June 7, 1866). On the outbreak of hostilities Manteuffel commanded a division of the army of the Main, which was destined to act against the south German allies of Austria. He took part in the battle of Langensalza (27th June), which brought about the capitulation of the Hanoverian army, and on 19th July succeeded Von Falckenstein as commander-in-chief of the Main army, and by winning the battles of Werbach, Tauberbischofsheim, Helmstädt, and Rossbrunn over the Bavarians and others he brought that part of the campaign to a successful issue. He entered the war of 1870 as commander of the First Corps, but was soon promoted to the command of the First army, which fought successfully at Amiens and other places. Transferred in January 1871 to the command of the army of the south, operating against Bourbaki, Manteuffel assailed the enemy's rear near Belfort, and drove 80,000 men across the frontier into Switzerland. When peace was proclaimed he was placed at the head of the army of occupation in France, and in 1879 was appointed imperial viceroy of the newly-organised provinces, Alsace-Lorraine. His administration was not a happy one: his endeavours to help on the process of Germanisation by direct efforts only incensed the clergy and upper classes, both French and German. He died at Carlsbad, 17th June 1885. See Life by Keck (Bielef. 1889).

Mantinea, an ancient city of Arcadia, in the Peloponnesus, situated on the river Ophis, in the midst of a broad plain. Here Epaminondas fell in the moment of a great victory over the Spartans, 362 B.C.

Mantis. This name is commonly applied to the various genera which constitute the family Mantidæ of the insect order Orthoptera. They are chiefly to be distinguished by the long prothorax and the enlarged front legs, which are fitted for grasping. They are entirely carnivorous in habit, but do not actively pursue their prey; the insect waits patiently until a fly comes within reach, and then rapidly seizes it with its fore-limbs (see the illustration).

Mantis religiosa.

The attitude adopted while waiting for insects to come within reach has given to one species, plentiful in the south of Europe, the name of 'praying mantis' (*M. religiosa*). This creature, invested with supernatural attributes, figures prominently in Bushman mythology and folklore. One of the most remarkable forms of mantis is the Indian *Hymenopus bicornis;* it has a flower-like shape and a pink colour. The apparent petals are the much-flattened joints of some of the limbs as it rests quietly among foliage. It is supposed that the resemblance to an orchid-like flower may delude smaller insects into approaching near enough for the mantis to take advantage of its 'alluring' colours and shape.

Mantling. See Heraldry.

Man-traps, engines for the terrifying of trespassers and poachers (formerly often indicated by the warning notice 'man-traps and spring-guns set here'), resembled gigantic rat-traps four feet long. They may be seen in museums; it is, since 1827, illegal to set them save indoors between sunset and sunrise, as a defence against burglars.

Mantua (Ital. *Man'tova*), a fortified city of Northern Italy, formerly capital of the duchy of the same name, 38 miles by rail N. of Modena and 25 S. by W. of Verona, occupies two islands formed by the Mincio, and stands in the midst of a marshy district, which, combined with its artificial fortifications, make it perhaps the strongest fortress in Italy. But at the same time its situation makes it liable to malaria. It forms one of the four fortresses of the Quadrilateral (q.v.). The streets are spacious, the squares numerous, and the population comparatively small, 28,048 in 1881; so that for this reason, and because of the numerous massive medieval buildings, the town has a lifeless and gloomy appearance. Chief amongst the buildings are the fortress of the Gonzagas, erected in 1393–1406, and adorned with paintings by Mantegna; it forms the oldest part of the ducal palace, built in 1302, which contains 500 rooms ornamented with paintings and designs of Giulio Romano; the Palazzo Te, outside the city walls on the south, the greatest monument to the skill of Giulio Romano as architect, painter, and sculptor; the cathedral of San Pietro, restored from designs by G. Romano; and the church of San Andrea, one of the finest Renaissance churches in Italy, containing the tomb of Mantegna, whose pupils

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adorned the walls with frescoes. The public institutions include an academy of arts and sciences, a library with 80,000 vols. and 1000 MSS., a museum of antiquities, an observatory, archives, a botanical garden, a large military hospital, &c. Virgil was born at Pietole (anc. *Andes*), now a suburb of Mantua. The industries include weaving, tanning, and saltpetre-refining. Some 3000 Jews live in Mantua. Mantua, an Etruscan town, was successively in the possession of the Romans, Ostrogoths, and Lombards before falling into the hands of the emperors, who gave it to the Marquis of Canossa. From him it passed to the Countess Matilda of Tuscany in 1052. After her death it was a free imperial city and joined the Lombard leagues against the Hohenstaufen emperors. The Buonacolsis made themselves masters of the city in 1247, but were ousted from power by the head of the Gonzaga (q.v.) family in 1328. This dynasty, the head of which was created duke by Charles V. in 1530, not only maintained themselves against their great rivals, the Visconti of Milan, but raised the city to the height of its splendour and renown. The last duke died childless in 1708, and his duchy was confiscated by Austria, who kept her hold of it down to 1866, except for two short periods (1797–99 and 1801–14), when it was in the possession of France. Mantua has endured at least three great sieges, by the Emperor Ferdinand II. in 1630, by the French in 1797, and by the Austrians in 1799. During the years 1830–59 it was the headquarters of much political persecution by the Austrian government. See Arco's History, in Italian (7 vols. 1871–74). The *province* has an area of 911 sq. m., and a pop. (1889) of 321,872.

Manu (from the Sanskrit *man*, 'to think,' lit. 'the thinking being') is the reputed author of the most renowned law-book of the ancient Hindus, and likewise of an ancient Kalpa work on Vedic rites. It is matter, however, of considerable doubt whether both works belong to the same individual, and whether the name Manu, especially in the case of the author of the law-book, was intended to designate an historical personage; for, in several passages of the Vedas (q.v.), as well as the Mahâbhârata (q.v.), Manu is mentioned as the progenitor of the human race; and, in the first chapter of the law-book ascribed to him, he declares himself to have been produced by Virâj, an offspring of the Supreme Being, and to have created all this universe. Hindu mythology knows, moreover, a succession of Manus, each of whom created, in his own period, the world anew after it had perished at the end of a mundane age. The word Manu—akin to our '*man*'—belongs therefore, properly speaking, to ancient Hindu mythology, and it was connected with the renowned law-book in order to impart to the latter the sanctity on which its authority rests. This work is not merely a law-book in the European sense of the word, it is likewise a system of cosmogony; it propounds metaphysical doctrines, teaches the art of government, and, amongst other things, treats of the state of the soul after death. The chief topics of its twelve books are the following: (1) creation; (2) education and the duties of a pupil, or the first order; (3) marriage and the duties of a householder, or the second order; (4) means of subsistence and private morals; (5) diet, purification, and the duties of women; (6) the duties of an anchorite and an ascetic, or the duties of the third and fourth orders; (7) government and the duties of a king and the military caste; (8) judicature and law, private and criminal; (9) continuation of the former and the duties of the commercial and servile castes; (10) mixed castes and the duties of the castes in time of distress; (11) penance and expiation; (12) transmigration and final beatitude. Bühler has proved that Max Müller was right in regarding the extant work as a versified recast of an ancient law-book, the manual of a particular Vedic school, the Mânavas; and holds that the work, the date of which used to be given at 1200 B.C., was certainly extant in the 2d century A.D., and seems to have been composed between that date and the 2d century B.C. There are many remarkable correspondences between this work and the Mahâbhârata, suggesting the use in both of common materials.

The laws of Manu were translated by Sir William Jones (1794). See also *The Ordinances of Manu*, translated from the Sanskrit, with introduction by Burnell, completed by Hopkins (1886); *The Laws of Manu*, translated with extracts from seven commentaries by G. Bühler (in 'Sacred Books of the East,' 1888).

Manure. Any material, whether of animal, vegetable, or mineral origin, which adds to the fertility of the soil has been generally regarded as manure. The application of stable and farmyard manure, as also the ashes of plants, &c., to the soil has been practised probably in all ages; but the scientific principles involved in this ancient practice were but little understood until more recent times, when chemists, botanists, and physiologists set themselves the task of explaining to the agriculturist the changes which are ever taking place in the soil and in the plant itself. On virgin soils crops may be grown for years without much evident diminution in quantity or quality; but a period must come when there will be an exhaustion of one or more of the constituents of plants, and the soil can then be no longer regarded as fertile. That is to say, soils contain certain proportions of certain ingredients; and when these are abstracted by the plant and carried away in the form of crops, the soil must in time become exhausted. It then becomes necessary to add to the soil in the form of manure such constituents as the crops have removed in order that the land may regain fertility. When we consider that Soils (q.v.) are formed mainly from the weathering of rocks, it will at once be understood how it is generally unnecessary that manures should contain such things as magnesia, iron, alumina, &c. Speaking generally, the constituents which are removed by plants from soils, the loss of which brings about that condition of 'exhaustion,' are compounds of nitrogen, phosphoric acid, and potash; and hence it is, in part at least, that farmyard manure is so universally regarded as the 'stand-by' of the agriculturist, for that material contains all those ingredients, and in a form easily assimilated by plants. It must not be overlooked, however, that possibly the chief advantages derived from the use of farmyard manure are that it makes the soil porous, and that the conditions which result from the decomposition of the organic matter are favourable to the development of those micro-organisms which bacteriologists are endeavouring to prove are of as much importance as the manure itself (see NITRIFICATION). Manures containing large proportions of organic matter, such as stable manure, wrack or seaweed, fish offal, &c., have value as plant-food; but the heat developed during their decomposition, or rotting, and the fact that the carbonic acid resulting from that change acts as a solvent on the mineral constituents of the soil and otherwise, are of still greater moment.

The first *artificial* manure systematically used was probably bones, applied in the earlier periods, either in an unground condition or simply bruised. About the beginning of the 19th century, however, it was proved that fineness of division rendered bone more easily assimilated by plants; and further progress still was made when Liebig introduced the treatment of bone with sulphuric acid, whereby chemical division was realised. There are about 50,000 tons of bone imported into Britain annually,

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while of home-collected bone not less than 60,000 tons are employed in the manufacture of manure, and of this latter quantity London alone produces fully 23,000 tons annually.

Guano.—Peruvian guano was at one time imported from the Chincha Islands in enormous quantities; but the old deposits are practically exhausted, and the quality of the now available supply is comparatively poor (see GUANO). Ichaboe (off south-west Africa) guano is still imported, though in somewhat limited quantity; but it is much the richest available guano. The value of these guanos lies in the percentages of nitrogenous organic matter, ammonia salts, phosphates of the alkalies and of lime, and the potash salts which they contain. Some of the islands in the South Pacific yield supplies of guano, but these are almost purely phosphatic, owing to the abundant rainfall of that region having washed out all the ammoniacal salts. Liebig's Guano and Liebig's Meat Meal are by-products from the preparation of Liebig's extract of meat. They are in a fine state of mechanical division, and are valuable sources of nitrogen and phosphates. Fish-guano is largely produced in Norway and the north of Scotland from fish offal (see GUANO). The process employed is essentially steaming to remove the oil, which is run off with the water; the solid residue is pressed and dried. The manurial constituents of this material are nitrogen and phosphates.

Dried Blood is another valuable source of nitrogen. Horn powder, shoddy and wool waste, leather raspings, &c. are also employed for the same purpose, but they are of much less value.

Phosphatic Substances.—The coprolites of Cambridge, Norfolk, and Suffolk come under this classification, as does also the land phosphate from the Ashley Basin of South Carolina, and the dredged phosphate from the Ashley and Cooper rivers. In addition to these we have Canadian apatite, Sombrero, Navassa, Somme, Belgian, Florida, Spanish, Curaçao, and numerous other phosphates. These are of little value as manure in their natural and ground state, and are almost wholly converted into superphosphate by the action of sulphuric acid, whereby the natural or tricalcic phosphate—which is insoluble in water—is converted into the monocalcic phosphate, which is soluble, and therefore readily available to plants.

Sulphate of Ammonia is principally derived from the destructive distillation of coal and shale (see GAS, Vol. V. p. 215, and PARAFFIN). Its value depends upon the percentage of ammonia which it contains. This salt sometimes contains sulphocyanide of ammonium, a substance which is inimical to plant-life. Some experimentalists assert with all confidence that ammonia salts must undergo nitrification before they can enter the plant; but that contention is scarcely now tenable, because nitrification is possible in some cases within the plant itself.

Nitrate of Soda or *Chili Saltpetre* is very extensively imported, and is sold on a basis of 95 per cent. nitrate, or '5 per cent. refraction'—i.e. not more than 5 per cent. of impurities. It is found native in several districts of South America in an impure state, and is rendered marketable by a process of solution and re-crystallising. Its action as a manure is comparable to that of nitrate of lime, nitrate of potash, or sulphate of ammonia. Its only valuable constituent is nitric acid, while in the other nitrates mentioned the base is also serviceable.

Potash Salts are of the utmost service to plants. Carse or clay lands generally contain a sufficiency of potash, while medium and light soils require it to be added. Nitrate, sulphate, and muriate are all more or less employed in compounding potash manures (i.e. manures containing potash as one of their constituents), but kainit—an impure potash salt largely imported from Germany—is perhaps the most generally used when a dressing of potash only is desired.

Liquid Manure may be classed with farmyard manure, as it is now very commonly absorbed in the 'courts' by the straw, &c. Occasionally it is used in the liquid form on grass or stubble land.

Lime is one of the most necessary constituents of soils and manures. It is generally applied 'fresh burned' to newly-broken land, or where there is an excessive amount of peat or similar material. Lime is the great *carrier* into plants of other 'stuffs' which go to form their organic compounds, and during this elaboration organic acids are formed, many, if not all, of which would poison the plants themselves but for the presence of lime, with which these organic acids combine to form insoluble non-poisonous compounds.

The study of the subject—manures and manuring—can be most profitably followed in the works of Lawes and Gilbert. Yet most of our manurial—or agricultural—experiments are but gropings in the dark; they are most misleading and inconclusive, mainly because the experimentalists have known little or nothing of the changes going on in the plant itself, or of the variations in those changes caused by the amount and intensity of light and heat. Until we know more about the micro-organisms in the soil, their life-history and functions, but little progress can be made; and until we have experimentalists capable of demonstrating the functions, chemical and physical, of plants, and the variations in those functions with the ever-varying climatic conditions, so-called agricultural research must lead to disappointment. See AGRICULTURE, COMPOSTS, ROTATION, and SEWAGE.

Manuscripts. See PALÆOGRAPHY, CODEX, PALIMPSEST, PAPYRUS, UNCIALS, ILLUMINATION.

Manuzio. See ALDINE EDITIONS.

Manx. See MAN, ISLE OF.

Manyplies. See DIGESTION.

Manzanilla, (1) a port of Mexico, on a fine bay opening to the Pacific, 31 miles by rail WSW. of Colima. The country around is equally fertile and unhealthy, and the trade is largely in the hands of Germans. Pop. 4000.—(2) A port on the south coast of Cuba, with a good harbour and export trade in valuable woods, sugar, &c. Its climate also is unhealthy. Pop. 8000.

Manzoni, ALESSANDRO, a great Italian writer, was born at Milan, March 7, 1785, of noble parents, and through his mother grandson of the celebrated Marquis Beccaria. He published his first poems in 1806, married happily in 1810, and spent the next few years in the composition of the *Inni Sacri*, sacred lyrics, and a treatise on the religious basis of morality, by way of reparation for the unbelief of early youth. In 1819 he published his first tragedy, *Il Conte di Carmagnola*, a trumpet-blast of romanticism; the second, *Adelchi*, followed in 1822. Manzoni's first tragedy had the honour to be defended by Goethe, 'one genius having divined the other.' But the work which gave Manzoni European fame is his historical novel, *I Promessi Sposi*, a Milanese story of the 17th century (3 vols. Milan, 1825–6–7). The tale abounds in interesting sketches of national and local Italian customs and modes of life, portrayed with unflagging spirit and humour, while various grave historical events are narrated with force and grandeur of style, especially the episode of the plague in Milan. Manzoni's noble ode, *Il Cinque Maggio*, was inspired by the death of the great Napoleon. His last years were darkened by the frequent shadow of death within his

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household. He himself died at Milan, 23d May 1873, leaving to posterity the memory not alone of a great writer, but of a singularly noble and sincere man.

A complete edition of his works, in 5 vols., was published by Nicolò Tommaseo (Florence, 1828-29). His Letters were collected by Sforza (1875); and a posthumous work on the French and Italian revolutions of 1789 and 1859 was edited by Bonghi (Milan, 1889). Bismara's *Bibliografia Manzoniana* (Turin, 1875) will be found useful. There are Lives (Italian) by Balbiani (1873), Bersezio (1873), Prina (1874), and Pugni (1876).

Ma'oris, the native inhabitants of New Zealand (q.v.).

Maormor. See EARL.

Map (Lat. *mappa*, 'a towel'). A map is a delineation on a plane of the surface of the earth or of a portion thereof, exhibiting the lines of latitude and longitude, &c., and the forms and relative positions of the countries, mountain-ranges, rivers, towns, &c.; or it may be of the starry heavens, or of stars and constellations. As it is manifestly impossible correctly to represent a spherical upon a plane surface, geographers are consequently necessitated to resort to expedients in order to minimise or distribute the unavoidable distortion and disproportion. Hence the use of the various map projections or arrangements of the lines of latitude and longitude. The only true representation of the earth's surface, it is clear, is to be found on the *terrestrial globe*. This is inconvenient in form and necessarily too small in scale to serve the purposes effected by maps proper, which are usually produced on paper or other convenient plane surfaces, and a series of which, conjoined, form an *atlas*. A *hydrographical* map, specially representing oceans, seas, or navigable waters with their coasts, sandbanks, currents, lighthouses, depths, and other objects and information of importance to seamen, is usually constructed on Mercator's projection, and is called a *Chart* (q.v.). A special *topographical* map represents the details minutely and on a considerable scale. The Ordnance Survey of Great Britain and Ireland is a good example of such, and is produced on various scales—viz. 6 inches and 1 inch to a mile respectively. Some counties are also published on a scale of 1 square inch to an acre. Similar products, the result of exact trigonometrical work, are extant of the continent of Europe from the Bay of Biscay to the Lower Volga, and from Sicily to St Petersburg. Portugal also is thus represented, and considerable parts of Sweden and Norway, but not of Turkey or Greece, and but little of Spain. Similarly advantaged are considerable portions of the United States, Algeria, the Nile Delta, Sinai, Palestine, India, Ceylon, and Java. The results of general but not detailed survey exist of the remaining portions of Europe, United States, Canada, Argentina, Cape Colony, eastern and southern Australia, New Zealand, Japan, China proper, and parts of central Asia, Persia, and Asia Minor. Much of the chartography of the rest of the known world is compiled from numerous observations and itineraries, and is fairly reliable. Extensive tracts of North and South America, north Asia, Australia, and most of Africa are only approximately correct. Maps are also constructed for special purposes, and are distinguished as physical, political, military, statistical, historical, &c.

Within the last half-century great improvement has been made in the art of map production or *chartography*, resulting in great clearness and the combination of a mass of information with artistic beauty. This is attained in some cases partly by the use of conventional signs or arrangements, such as the adoption of blue colour for coasts and watercourses, brown for mountain-ranges, and various tintings for the divisions, political or otherwise, and to distinguish the various natures of the surface, such as forest, arable, prairie, desert, elevation, &c. The art of lithography has been an invaluable aid in all such cases. In Germany especially has this science-art been carried to the greatest perfection.

The *scale* or definite relation of a map to the actual size of nature is indicated by a graduated line, showing by its divisions the number of miles or yards corresponding to any space measured on the map. In comparing various maps by their scales, it is convenient to refer to the *scale of nature*, frequently indicated in proportional figures, thus—1 : 3,700,000; 1 : 500,000, &c.

The lines of *projection* on a map are essential for determining the positions of the parts, and indicate latitude, or distance north or south from the equator, and longitude, or distance east or west from any given line. These lines are called meridians, and are usually numbered from the meridian of Greenwich on English maps, and indeed on nearly all maps. Other first meridians in common use are those of Paris, Washington, and Ferro (see LATITUDE AND LONGITUDE). These distances are given in degrees, minutes, and seconds, as in other circle measurements. In choosing a projection, regard must be had to the purpose for which it is intended, and to the area to be represented. The errors inherent in a projection nearly imperceptible in a map of England might be fatal to its use in a map of Asia. In a map of the world equivalence of area is of less importance than freedom from distortion and correctness of relative position. There have been numerous forms of projection devised, including perspectives and approximative developments. Of these only the more familiar can be described here.

The plane on which the perspective map is drawn is supposed to pass through the centre of the earth, and, according to the distance of the eye, the projection is either of the first, second, or third of the following. (1) In the *orthographic* the eye is assumed to be at an infinite distance from the centre of the earth, so that all rays of light proceeding from every point in its surface are parallel and perpendicular. From the nature of this projection, it is evident that, while

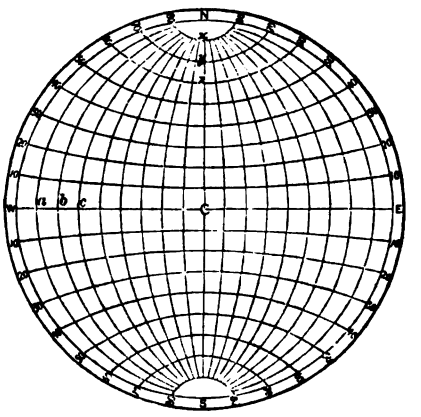

Fig. 1.
Globular, or Equidistant Projection of a Hemisphere.

the central parts of the hemisphere are fairly accurately represented, the parts towards the circumference are crowded together and diminished in size. On this account it is of little use for geographical purposes, but most suitable for maps of the moon. (2) In the *stereographic* the eye or point of projection is assumed to be placed on

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the surface of the sphere opposite the one to be delineated. If the globe were transparent, the eye would then see the opposite concave surface. Contrary to the orthographic, this method contracts the centre of the map, and enlarges it towards the circumference. Owing to the unequal area of the divisions, and the difficulty of finding the true latitude and longitude of places, this projection is not much employed. (3) In order to rectify the opposite effects of the two preceding, the *globular* projection, a modification of the two, is generally adopted. If we suppose the eye to be removed from the surface to a distance equal to the sine of 45° of the circumscribing circle, the projection is called globular. In other words, if the diameter of the sphere be 200 parts, it must be produced 70 of these parts in order to give the point of projection. All meridians and parallels in this projection are in reality elliptical curves; but as they approach so nearly to circular arcs, they are very rarely shown otherwise.

The construction of the globular or equidistant projection is as follows (fig. 1): Describe a circle, NESW, to represent a meridian, and draw two diameters, NCS and WCE, perpendicular to each other, the one for a central meridian, the other for the equator. Then N and S will represent the north and south poles. Divide each of the quadrants into nine equal parts, and each of the radii, CN, CE, CS, and CW, also into nine equal parts. Produce NS both ways, and find on it the centres of circles which will pass through the three points 80 *x* 80, 70 *y* 70, &c., and these arcs described on both sides of the equator will be the parallels of latitude. In like manner, find on WE produced the centres of circles which must pass through *a*, *b*, &c., and the poles. Having selected the first meridian, number the others successively to the east and west of it. A map may in this way be constructed on the rational horizon of any place.

The impossibility of getting a satisfactory representation of special parts of the sphere by any of the previous methods leads to the desire for others less defective. Of all solid bodies whose surfaces can be accurately developed or rolled out upon a plane without alteration, the cone and cylinder approach nearest to the character of the sphere. A portion of the sphere between two parallels not far distant from each other corresponds very nearly to a like conical zone; whence it is that conical developments make the best projections for limited portions of the earth's surface, and even with some modifications for more extensive portions.

A conical projection of Europe (fig. 2) is constructed thus: Draw a base-line, AB; bisect it in E, and at that point erect a perpendicular, ED, to form the central meridian of the map. Take a space for 5° of latitude, and, since Europe lies between the 35th and 75th parallels of latitude, mark off eight of these spaces along ED for the points through which the parallels must pass. The centre from which to describe the parallels will be the point in ED where the top of a cone, cutting the globe at the 45th and 65th parallels, would meet the axis of the sphere. This point will be found to be beyond the North Pole at C. On the parallels of 45° and 65°, where the cone cuts the sphere, mark off equivalents to 5° of longitude, in proportion to the degrees of latitude in those parallels, and if straight lines be drawn through these points from C they will represent the meridians for every 5°. A modification of the conic projection, suitable for more extensive portions of the sphere, such as of Asia, is obtained by giving on each parallel of latitude the true meridional proportional distances, which results in a curving of the meridian lines outward from the centre of the map.

In all the projections hitherto described the direction either of the north and south, or of the east and west, is represented by a curved line, so

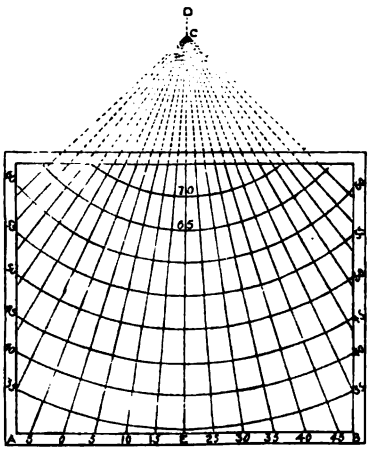

Fig. 2.—Conical Projection of Europe.

that on such a map the course of a vessel would almost always be laid down in a curve, which could only be described by continually laying off from the meridian a line at an angle equal to that made with the meridian by the point of the compass at which the ship was sailing. If the vessel were to steer in a direct north-east course by one of the previous projections, she would, if land did not intervene, describe a spiral. The mariner, however, requires a chart which will enable him to steer his course by compass in straight lines only. This valuable instrument is supplied by Mercator's chart, a cylindrical projection in which all the meridians are straight lines *perpendicular* to the equator, and all the parallels straight lines *parallel* to the equator. It is constructed thus (fig. 3): A

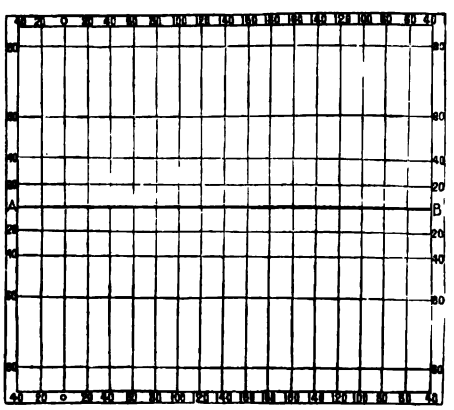

Fig. 3.—Mercator's Projection.

line, AB, is drawn of the required length for the equator. This line is divided into 36, 24, or 18 equal parts, for meridians at 10°, 15°, or 20° apart, and the meridians are then drawn through these perpendicular to AB. From a table of meridional parts (a table of the number of minutes of a degree of longitude at the equator comprised between that and every parallel of latitude up to 89°) take the distances of the parallels, tropics, and arctic circles from the equator, and mark them off to north and south of it. Join these points, and the projection is made.

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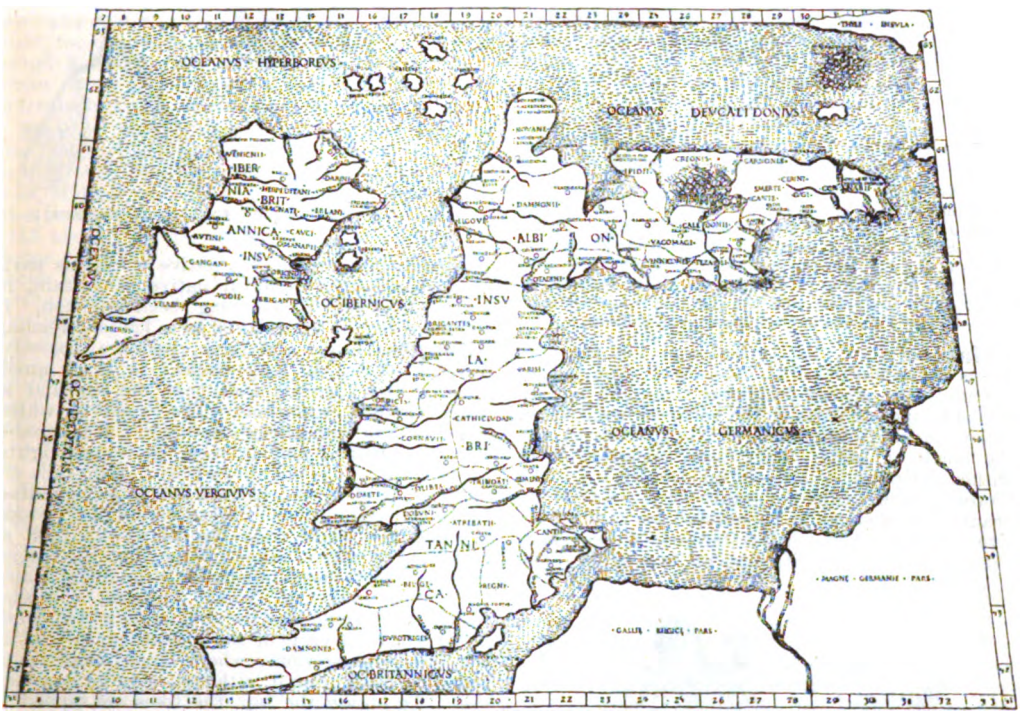
This projection, of course, does not give a natural representation of the earth, its effect being to exaggerate the polar regions immensely. The distortion in the form of countries and relative direction of places is rectified by the degrees of latitude being made to increase proportionably to those of longitude. There are other cylindrical projections of the sphere, but this is the most generally valuable and best known. It gives an unbroken view of the earth's surface with the exception of the poles, which are infinitely remote.

Historical.—The ancient Greeks considered Anaximander (560 B.C.) as the inventor of cartography; but there is evidence that about 1000 years earlier some attempts in that direction had been made amongst the Egyptians. Necessarily these efforts were of the crudest, and were made upon the supposition that the earth was a plane. After Aristotle the spherical theory was adopted, and the application of astronomical observations to geography was first made by Pytheas of Massilia (326 B.C.), and the first attempts at projections by Dicæarchus of Messana (310 B.C.). Ptolemy's (150 A.D.) rational teaching had an ultimate valuable influence in the treatment of cartography, although the Romans made little progress in the art, which during the middle ages also showed almost no advance. In the 14th and 15th centuries a gratifying improvement is observable in Italian nautical charts. In the 15th century the revivals of Ptolemy's teaching produced a revolution in the construction of maps, and laid the foundation of modern cartography. There was great increase in the number and importance of maps. The first attempts to improve and increase the methods of projection known to the Greeks were made by Germans, viz. Johann Stöffler (1452–1536), and Peter Apianus (1495–1552), &c. In the same period that Mercator (Gerhard Kremer, 1512–1594) made his invaluable contributions, the Italians,



Map of British Islands, reduced from the Latin Ptolemy of 1478.

Germans, and Dutch were active competitors in geographical work. Amongst the increasing host of names connected with the subject are found that of Sebastian Cabot (1544), who produced his map of the world. In Germany, Johann Baptist Homann (1644–1724) and Tobias Mayer (1723–86) occur; in France, Nicolas Sanson (1600–67), Guillaume de l'Isle (1675–1726), and Jean Baptiste Bougignon d'Anville (1697–1782); and in Italy, P. Vincent Cornelli (d. 1718). In the 18th century France led the way in cartography by state survey resulting in the *Carte Géometrique de la France*. The British Ordnance Survey was begun in 1784.

In our own times excellent maps are produced by the million accessible to all classes, and are of great account for educational purposes. The most prominent names of recent cartographers are—German: Kiepert, Berghaus, Petermann, Hassenstein, Habenicht, Justus Perthes, &c.; Italian: Guido; Coro; British: Arrowsmith, Hughes (*educational*), Ravenstein, and the geographical firms of W. & A. K. Johnston, E. Stanford, and Bartholomew & Co. See also the articles CONTOUR LINES, DEGREE, EARTH, LATITUDE AND LONGITUDE, MERIDIAN, ORDNANCE SURVEY.

Map (less correctly, MAPES), WALTER, a great 12th-century writer, was born on the Welsh marches, perhaps in Herefordshire, about 1137. He studied at the university of Paris, became an intimate friend of Becket, was a justice-in-eyre at Gloucester assize in 1173, attended the king the same year to Limoges, and for many years later, probably as chaplain, and was sent on missions to Paris and to Rome. He enjoyed the living of Westbury in Gloucestershire, where he had a long feud for his rights with the monks of a neighbouring Cistercian convent, and became canon of St Paul's and precentor of Lincoln, but still continued his attendance on the king. In 1196, under Richard I., he became archdeacon of Oxford, and so passes from recorded history. Map was a frank, open-hearted man, with a quick wit, bold humour, and an indignant contempt for hypocrisy. All these qualities

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are revealed in a number of Latin satirical poems long connected (and apparently on good grounds) with his name. Of these the chief are the Golias series (*Apocalypsis Goliæ*, *Predicatio*, *Confessio*, &c.). In the latter occurs the famous 'Meum est propositum in taberna mori,' which is far more a stern satire by self-revelation than a jovial drinking-song, as often understood. In Bishop Golias the writer has realised by creative imagination a type of the ribald priest, and upon his head he pours out the vials of his wrath and scorn, with humour rich, bold, sometimes coarse, but always honest. Map seems to have kept well the secret of his authorship, for even his friend Giraldus Cambrensis did not know their origin, as we find him, with the churchman's proverbial dislike to see the humorist point out the stains upon his cloth, denouncing Golias as a foul-mouthed scoffer.

Sir Galahad, the stainless knight, was Map's creation, and there is the best reason, with M. Paulin Paris, to count him the heart and soul of that contemporary work of Christian spiritualisation which systematised and gave a meaning to the detached Arthurian romances. He wrote most probably the Latin original of Robert Borron's introductory romance of the *Saint Graal*, and certainly *Lancelot of the Lake*, the *Quest* of the Saint Graal, and the *Mort Artus*. M. Paris confines his direct work to the two Graal romances and the opening of Merlin.

Thomas Wright edited for the Camden Society Map's *Latin Poems* (1841) and the *De Nugis Curialium* (1850), an interesting kind of note-book of the court-gossip and events of the day, interspersed with theological polemics, anecdotes, and accounts of miracles, fairy legends, or *apparitiones fantasticæ*, and the dissuasion against marriage sent by Valerius to the philosopher Rufinus.

Maple (*Acer*), the typical and the principal genus of the natural order Aceraceæ. The species are numerous, all are deciduous trees, and natives of the temperate parts of the northern hemisphere, and particularly numerous in North America and the north of India. They have opposite leaves without stipules, usually lobed or palmate. The flowers are in axillary corymbs or racemes of no beauty, but abound in honey, and are very attractive to bees. The fruit is formed of two small winged nuts, each with one or two seeds.—The

Fig. 1.—*a*, Common Maple (*Acer campestre*); *b*, Japan Maple (*Acer palmatum*).

Common Maple (*A. campestre*), a small tree, is a native of Britain, and of many parts of Europe and Asia. The wood is compact, fine grained, and takes a high polish; hence it is much used by turners and for carved work, being frequently substituted for the wood of the Holly and Box by mathematical instrument makers. Several nearly-allied species are found in the south of Europe.—The Striped Bark Maple (*A. striatum*) of North America, where it often forms great part of the undergrowth in woods, is so named because the smooth bark of the two-year-old branches are beautifully varied with green and white stripes; its wood, which is very white, is used for inlaying in cabinet-work.—The Greater Maple or Sycamore (*A. pseudo-platanus*), commonly called

Fig. 2.—Greater Maple (*Acer pseudo-platanus*): *a*, fruit.

Plane-tree in Scotland, is a native of various parts of Europe, but a doubtful native of Britain, in which, however, it has long been common. It attains a height of 70 to 90 feet, has a spreading umbrageous head, and large, palmate, coarsely-serrated leaves on long stalks. It is of quick growth, and succeeds well near the sea and in other exposed situations. The wood is white, compact, and firm, though not hard; it is capable of a fine polish, and is used by wheelwrights, turners, &c. It is not apt to warp. Stair-rails are often made of it, and pattern-blocks for manufactories, as well as bowls, bread-plates, &c. Sugar is sometimes made from the sap of this tree, as from that of several other maples; but the species which yields it most abundantly is the Sugar Maple (*A. saccharinum*) of North America, a species which much resembles the sycamore, and abounds in the northern parts of the United States and in the British possessions, where large quantities of sugar are made from it, although only for domestic use. To obtain the sap, the trees are tapped in February, March, and April, according to the locality and the season, and when warm days and frosty nights occur, which favour its flow. An incision is made in the trunk with an auger or axe, at first half an inch deep, and is increased by degrees to two inches. A spout of sumach or elder is then inserted, through which the sap flows into a trough, whence it is conveyed daily to a larger receiver; from this, after being strained, it is carried to the boiler. Being liable to ferment, it cannot be kept long after being collected. The boiling and refining processes are the same as those in the manufacture of cane-sugar. A single tree yields from two to six pounds in a season. Good vinegar is made from it, and a kind of molasses much superior to that from the sugar-cane, and much used in America with buckwheat cakes, &c. The wood of the Sugar Maple has a satiny appearance, and is used for cabinet-making; it is sometimes finely marked with undulations of fibre, and is then known as *Bird's-eye Maple*, and is used for veneers. The Sugar Maple is not so hardy in the climate of Britain as the sycamore, and seems to

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require a dry and sheltered situation.—The Norway Maple (*A. platanoides*), a native of the north of Europe, although not of Britain, is also found in North America; it much resembles the sycamore.—A Himalayan species (*A. villosum*), a noble tree, found with pines and birches at great elevations, is sometimes grown in Britain. A large number of interesting and remarkably beautiful forms of several Japan species of Acer, such as *A. dissectum* and *A. palmatum*, have been introduced within the last few years; they have proved hardy in many favoured districts of England and Ireland, but are unsuited to Scotland generally, though they are occasionally seen there in conservatories cultivated in pots.

Maqui (*Aristotelia Maqui*), the only known species of the genus, which belongs to the natural order Tiliaceæ, and has been made the type of a proposed order. It is an evergreen or sub-evergreen shrub, of considerable size, a native of Chili. The Chilians make a wine from its berry, which they administer in malignant fevers. The wood is used for making musical instruments, and the tough bark for their strings. The Maqui sometimes ripens fruit against a wall in England, and is frequently cultivated as an ornamental shrub.

Mar, an ancient district of Scotland between the Dee and the Don, comprising nearly the south half of Aberdeenshire, and subdivided into Braemar, Midmar, and Cromar. In 1014 a Mormaer of Mar was present at the battle of Clontarf; and in 1115 another figures in the foundation charter of Scone priory as 'comes' or earl. The male line of these Celtic Earls of Mar expired in 1377 with Thomas, thirteenth earl, whose sister Margaret married William, first Earl of Douglas. Their daughter, Isabella, in 1404 married Alexander Stewart, the 'Wolfe of Badenoch,' who, after her death in 1419, was designated Earl of Mar. The earldom by right should have gone to Janet Keith, great-granddaughter of Gratney, eleventh Celtic earl, and wife to Sir Thomas Erskine; but it was not till 1565 that it was either restored, or else granted by a new creation with limitation to heirs male, to their sixth descendant, John, sixth Lord Erskine, who at his death in 1572 had been for a twelvemonth regent of Scotland. John, Earl of Mar (1675–1732), who began life as a Whig, and by his frequent change of sides earned the nickname of 'Bobbing Joan,' headed the rebellion of 1715 (see JACOBITES), and died in exile at Aix-la-Chapelle. In 1824 the reversion of his attainder was procured by his grandson, John Francis Erskine, but his grandson dying without issue in 1866, the question arose whether the earldom of Mar could pass through his sister to her son, John Francis Goodeve-Erskine (*né* Goodeve), or must go to his first cousin, Walter Coningsby Erskine, Earl of Kellie. And the strange solution of that question has been that in 1875 Walter Henry Erskine, thirteenth Earl of Kellie, was declared by the Committee of Privileges also eleventh Earl of Mar, and that in 1885 the Earldom of Mar Restitution Bill declared Mr Goodeve-Erskine twenty-sixth Earl of Mar, claiming creation before 1014, but allowed precedence 1404. See the Earl of Crawford's *Earldom of Mar in Sunshine and Shade* (2 vols. Edin. 1882).

Marabou Feathers. See ADJUTANT.

Marabouts, a name derived from the Arabic word *morabit*, and used to designate a religious devotee or ascetic. They have always been found chiefly in north Africa, and have at times exercised considerable political influence, as in encouraging opposition to the French conquests in Algeria and Tunis in the 19th century, and in former centuries as the origin and mainstay of the Almoravid dynasty, which held Morocco and Spain for a long period. These devotees are held in great veneration by the Berbers; they frequently officiate at mosques and chapels, and are believed to possess the power to prophesy and work miracles. The dignity is generally hereditary. The name is also applied to the tombs of the devotees.

Maracaybo, a fortified city of Venezuela, is situated on the west shore of the strait which connects the lake and gulf of Maracaybo. It is a handsome town, with many gardens and squares, a college, hospitals, a theatre, a German club-house, the usual government buildings, a custom-house, wharves, and a number of manufactories. The climate is hot, the soil sandy, and the place unhealthy, owing mainly to the unsanitary domestic arrangements. The trade is chiefly in the hands of Germans, Danes, and North Americans. The staple export is coffee (£1,367,291 in 1889); box-wood, lignum vitae, cedar, and other woods, besides divi-divi, hides and skins, and some cocoa, gums, and fish sounds, are the other exports, the value of which (including coffee) in 1889 reached about £1,500,000. Fully seven-eighths of these go to the United States, although most of the merchandise imported comes from Great Britain, Germany, and France. Pop. (1888) 34,284.

The *Gulf of Maracaybo* is a wide inlet of the Caribbean Sea, extending from the peninsulas of Paraguana and Guajira to the strait by which it is connected with the lake. The latter forms the floor of a great valley, shut in by lofty mountains. Its waters are sweet, and deep enough for the largest vessels; but the bar at the mouth, where a swift current runs, makes entrance difficult. The gulf and lake were discovered in 1499 by Ojeda, who found here houses built on piles, and so gave the district the name Venezuela ('Little Venice'), which was afterwards extended to the entire country.

Maragha, a town of western Persia, 55 miles S. of Tabriz and 20 miles E. of Lake Urmia. It is celebrated as the capital of Hulagu Khan, grandson of Genghis Khan, and as the site of the observatory which Hulagu built for the astronomer Nasr ed-Din. Pop. 13,260.

Marajó, an island situated between the estuaries of the Amazon and Para, with an area of nearly 18,000 sq. m. It is for the most part low and covered with grass and bush, but in the east and south with dense forest. The soil is fertile, and large herds of cattle are reared in the north-east.

Maranham', or MARANHÃO, a maritime state of Brazil, bounded on the north by the Atlantic Ocean, with an area of 177,566 sq. m. and a pop. (1888) of 488,443. The surface is uneven, but there is no range of mountains. There are numerous rivers falling into the Atlantic, large forests, extensive plains where cattle are reared; the climate is fine, the soil fertile. Agriculture, however, has not prospered here, and the emancipation of the slaves, on whose labour it had depended, was followed by a period of great depression. Cotton and sugar are the principal products.—The chief city is *Maranham*, or *San Luiz de Maranham*, on an island between the mouths of the Mearim and the Itapicurú. It is a well-built town, clean, gay, hospitable, and has a pop. of 35,000. It contains a cathedral and bishop's palace, a hospital, a technical school, some sugar and spinning and weaving factories, and docks that admit ships drawing 14 feet. The chief exports (£420,656 in the year 1887–88, £282,004 in 1888–89) are cotton and sugar; then come hides and goat and deer skins, gum, balsam, cotton-seed, india-rubber, &c. Portugal is the largest customer, followed by Britain, which sends three-fourths of the total imports (about £520,000 annually).

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Marañon. See AMAZON.

Maraschi'no. See LIQUEUR.

Marat, JEAN PAUL, one of the most prominent figures in the French Revolution, was born at Boudry in Neuchâtel, May 24, 1743, eldest child of Jean Paul Mara, a physician and native of Cagliari, who had married Louise Cabrol, a Genevan Protestant. He studied medicine at Bordeaux, next went to Paris, to Holland, and to London, where for some time he practised his profession with success, and published a materialistic *Philosophical Essay on Man* (1773), sharply attacking Helvétius, and anonymously a political essay, *The Chains of Slavery* (1774). In 1775 he paid a visit to Edinburgh, and was made on June 30, on the recommendation of certain Edinburgh physicians, M.D. of St Andrews University; and it hardly admits of doubt that he was not the John Peter le Maitre, *alias* Maire, *alias* Mara, who got five years at Oxford assizes in March 1777 for stealing coins and medals. For in June 1777 his character and reputation as a physician and oculist stood so high that he was made brevet-physician to his guards by the Comte d'Artois, afterwards King Charles X.—an office which he held till 1786. Meantime he continued his scientific work in optics and electricity, attracting the attention of Franklin and Goethe, but the Académie des Sciences refused him admission on account of his attack on Newton. Further writings were his anonymous *Plan de Législation Criminelle* (1780), a translation of Newton's *Optics* (1787), and *Mémoires Académiques, ou Nouvelles Découvertes sur la Lumière* (1788).

But all Paris was now infected with the fever of revolution, and Marat flung himself with characteristic ardour into the war of pamphlets, and at length in September 1788 established his famous and infamous paper, *L'Ami du Peuple.* Throughout he fought ever for his own hand, with bleareyed honesty and indomitable persistence, constantly croaking of treachery in high places, and denouncing with feverish suspiciousness in turn Necker, Bailly, Lafayette, the king, Dumouriez, and the Girondins. His virulence provoked the most vehement hatred, and covered his own head with calumnies which survived for generations; but it made him the darling of the scum of Paris, and placed great power in his hands at some of the most momentous crises of the Revolution. His printing-press had to be cunningly concealed from Lafayette's police, twice at least he had to flee to London, and once he was forced to hide for a time in the sewers of Paris, where he contracted a loathsome skin disease, yet was tended with affectionate faithfulness by Simonne Evrard, whom he had married 'one fine day in presence of the sun.' His sufferings deepened his frenzied hatred and suspicion of constituted authority, and there can be no doubt that on his head rests in great measure the guilt of the infamous September massacres. He was elected to the Convention as one of the deputies for Paris, and was perhaps the most unpopular man within the house, where indeed his influence never became more than contemptible. On the declaration of the republic he started his paper anew under the title *Journal de la République Française.* After the king's death his last energies were spent in a mortal struggle with the Girondins, who subscribed their own downfall when their formal accusation of Marat failed before the tribunal. But it was the tribune's last triumph. He was dying fast of the disease he had contracted in the sewers, and could only write sitting in his bath. There his destiny reached him through the knife of Charlotte Corday (q.v.), in the evening of the 13th July 1793. His body was committed to the Panthéon with the greatest public honours, to be cast out but fifteen months later amid popular execration.

See the Histories of the French Revolution by Mignet, Thiers, Michelet, Louis Blanc, Carlyle, Von Sybel, and H. Morse Stephens; A. Bougeart, *Marat, l'Ami du Peuple* (2 vols. 1864); but especially the works by F. Chevremont, *Marat, Index du Bibliophile* (1876); *Placards de Marat* (1877); and his exhaustive *Jean Paul Marat, esprit politique, accompagné de sa vie scientifique, politique, et privée* (2 vols. 1881).

Marathi. See MAHRATTAS, INDIA.

Marathon, a village on the east coast of ancient Attica, 22 miles NE. of Athens, long supposed to be the modern *Marathona.* It stood in a plain 6 miles long and from 3 to 1½ miles broad, with a background of mountains in the west, and a marsh both on the north and south; eastward it reached the sea—'The mountains look on Marathon, and Marathon looks on the sea.' Recent investigations by Prussian officers identify the historic village with that of Brana, nearly 2½ miles to the south, and locate the battle in the plain between the mountain Stavrokoraki and the sea, nearly 3 miles north-east of Brana. The name of Marathon is gloriously memorable as the scene of the great defeat of the Persian hordes of Darius by the Greeks under Miltiades (490 B.C.)—one of the decisive battles of the world.

Marave'di, an old Spanish copper coin in use from 1474 to 1848, was worth about $\frac{1}{12}$th of a penny. There were also, at an earlier period, maravedis of gold and of silver.

Marbeck, or MERBECKE, JOHN, organist of St George's Chapel, Windsor, was condemned to the stake about 1544 for favouring the Reformation, but pardoned by favour of Bishop Gardiner. In 1550 he published his famous *Booke of Common Praier Noted,* an adaptation of the plain chant of the earlier rituals to the first liturgy of Edward VI. He wrote several theological and controversial works; and a hymn for three voices and parts of a mass by him are extant. He died about 1585.

Marble, in its strict and proper sense, is a rock crystallised in a saccharoidal manner, having the fracture of loaf-sugar, and composed of carbonate of lime, either almost pure when the colour is white, or combined with oxide of iron or other impurities which give various colours to it. But many other kinds of stone are popularly included under this title. Indeed any limestone rock sufficiently compact to admit of a polish is called marble. It is only in this vague sense that the indurated amorphous rocks used in Britain can receive this name. Such are the black, red, gray, and variegated limestones of the Devonian system, which are very beautiful from the numbers of exquisitely-preserved corals which abound in them; the marbles of the Carboniferous series from Flintshire, Derbyshire, and Yorkshire, so full of encrinites; the shell marbles from the Oolitic rocks at Rance, Stamford, and Yeovil; and the dark Purbeck and Petworth marbles, beautifully 'figured' with shells, from the Wealden strata, which were so much used by the architects of the middle ages.

Saccharine or statuary marble is a white fine-grained rock, resembling loaf-sugar in colour and texture, working freely in every direction, not liable to splinter, and taking a fine polish. Of the marbles used by the ancients, the most famous was Parian marble, a finely granular and very durable stone, with a waxy appearance when polished. Some of the finest Grecian sculptures were formed of this marble, among others, the famous Venus de Medici. The marble of Pentelicus was at one time preferred by the Greeks to Parian, because it was whiter and finer grained. The Parthenon was entirely built of it, and many

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famous statues still remain which were executed in this marble, but they are always more or less weathered, never retaining the beautiful finish of the Parian statues. The quarries at Carrara (q.v.) were known to the ancients, but they have been more extensively wrought for modern sculptors, who use this marble chiefly. It is a fine-grained, pure white marble, but is so often traversed by gray veins that it is difficult to get large blocks free from these. Of coloured marbles, the best known are the Rosso Antico, a deep blood-red, sprinkled with minute white dots; Verde Antico, a clouded green produced by a mixture of white marble and green serpentine; Giallo Antico, a deep yellow, with black or yellow rings; and Nero Antico, a deep black marble.

A true marble is a crystalline granular aggregate of calcite, the granules being of remarkably uniform size. Not infrequently scales of mica or talc occur scattered through the rock. Such a rock is of metamorphic origin: it is simply a limestone which has been rendered entirely crystalline from the effects of heat under pressure, as in the vicinity of large intrusions of igneous rock. Marble may therefore be of any geological age. Many crystalline limestones, which are sometimes entitled to the name of marble, occur associated with gneiss and mica-schist, and are often rich in such minerals as garnet, actinolite, zoisite, mica, &c.

Marblehead, a seaport town of Massachusetts, on a rocky promontory, 18 miles NE. of Boston. Its share in the fisheries is no longer important, and the manufacture of boots and shoes is the chief industry. Pop. (1885) 7518.

Marburg, a quaint old town in the Prussian province of Hesse-Nassau, on the Lahn, 59 miles by rail N. of Frankfort and 64 SW. of Cassel. It is built on a terraced hill, whose summit is crowned by a stately castle, dating from 1065. In its Rittersaal (1277–1312) was held in 1529 the conference between the Wittenberg and the Swiss reformers regarding the Lord's Supper. The fine Gothic church of Elizabeth with two towers 243 feet high, was built in 1235–83 by the Teutonic Knights over the splendid shrine of St Elizabeth (q.v.), and was thoroughly restored in 1850–67. The university occupies new Gothic buildings of 1879. It was founded in 1527 in the Reformed interest by Philip the Magnanimous, Landgrave of Hesse; and among its earliest students were Patrick Hamilton and William Tyndale. It has about 80 professors and teachers, 800 to 1000 students in philosophy, medicine, theology, and jurisprudence, and a library of 120,000 volumes. Pop. (1875) 9600; (1885) 12,668. See three works by Kolbe (Marburg, 1871–84).

Marcantonio, or in full, M. RAIMONDI, an Italian engraver, born at Bologna late in the 15th century. A goldsmith by trade, he early turned to engraving, and received his first great stimulus from woodcuts of Albrecht Dürer, which he saw at Venice about 1505. He copied on copper two sets of plates from the German master's designs for the 'Life of the Virgin' and the 'Passion of Christ' (see DÜRER). At Rome, where he worked from 1510, he was chiefly engaged in engraving Raphael's works, as 'Lucretia,' the 'Massacre of the Innocents,' the 'Three Doctors of the Church,' 'Adam and Eve,' 'Dido,' 'Poetry,' the 'Judgment of Paris,' &c., and subsequently those of Raphael's pupil, Giulio Romano. On account of the power of his drawing and the purity of his expression, he is accounted the best amongst the engravers of the great painter. The capture of Rome by the Constable Bourbon in 1527 drove Marcantonio back to Bologna, where he probably remained until he died, some time before 1534 came to an end. See the essay by Fisher prefixed to the catalogue of his engraved works exhibited in London in 1868, and Delaborde's monograph (Paris, 1887).

Marcasite, an iron ore, a variety of Pyrites (q.v.).

Marceau, FRANÇOIS SÉVERIN DESGRAVIERS, French general, was born at Chartres on 1st March 1769. On the outbreak of the Revolution he was appointed inspector of the national guard in his native town, and in 1792 helped to defend Verdun with a body of volunteers till its surrender. His brilliant military career was ended in four years from this time; but they were four years of stirring activity. Sent in the following year to join the republican army in La Vendée, he was, for his services in the engagements before Saumur and Le Mans, promoted to the rank of general of division. Then, proceeding to the north-east frontier, he commanded the right wing at Fleurus, and after the allies retreated occupied Coblenz. During the campaign of 1796 he was given command of the first division of Jourdan's army, and sat down to invest Mainz, Mannheim, and Coblenz. But whilst covering the retreat of the French at Altenkirchen he was shot, on 19th September, and died four days later. His body was buried in the entrenched camp at Coblenz, but was transferred to the Panthéon in Paris in 1889. He ranks next after Hoche amongst the French generals of the early years of the Revolution, not only for military genius, but also on account of the nobility and uprightness of his personal character. See Lives by Doublet de Boisthibault (Chartres, 1851) and Maze (Paris, 1888).

Marcello, BENEDETTO, musical composer, born in Venice on 1st August 1686, was a judge of the republic, and a member of the Council of Forty, and afterwards held important administrative offices at Pola and Brescia, where he died on 24th July 1739. He had a passion for music, and is remembered as the composer of music for Giustiniani's version of the Psalms (8 vols. 1724–27), of numerous concertos, canzonis, cantatas, a pastoral, an oratorio, and other pieces, distinguished for their simple yet elevated style, and as the author of a satirical work, *Il Teatro alla Moda* (1720).

Marcellus, the name of two popes, of whom the second deserves special notice, as having, when Cardinal Marcello Cervini, taken a very prominent part in the discussions of the Council of Trent, over which he was appointed to preside as legate of Julius III. He was elected pope 10th April 1555, and survived his elevation but twenty-two days. He did not follow the usual custom of laying aside his baptismal name and assuming a new one.

Marcellus, M. CLAUDIUS, a famous Roman general, of one of the most eminent plebeian families. In his first consulship (222 B.C.) he defeated the Insubrian Gauls, and slew with his own hand their king, Britomartus or Viridomarus, whose spoils he dedicated as *spolia opima* to Jupiter —the third and last occasion in Roman history. In the second Punic war Marcellus took command after the disaster of Cannæ, and put a check upon the victorious Hannibal at Nola, in Campania (216 B.C.). Again consul in 214 B.C., he gave a fresh impulse to the war in Sicily, but all his efforts to take Syracuse were rendered unavailing by the skill of Archimedes, and he was compelled to regularly blockade the city. Famine, pestilence, and ultimately treachery on the part of the Spanish auxiliaries of the Syracusans, opened its gates (212 B.C.), after which the remainder of Sicily was soon brought under the dominion of the Romans.

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In his fifth consulship, 208 B.C., he fell in a skirmish against Hannibal.

Marcet, JANE, known as MRS MARCET, the author of a very popular elementary introduction to chemistry entitled *Conversations on Chemistry*, through which Faraday made his first acquaintance with the subject. She was the daughter of a rich London merchant, a Swiss by birth, and was herself born at Geneva in 1769. She married Alexander Mercet, a Genevan, who settled in London as a doctor in the last years of the 18th century, and later in life devoted himself to experimental chemistry. Besides the book on chemistry, which reached the 16th ed. in 1853, she wrote *Conversations on Political Economy* (1817; 7th ed. 1839), which was warmly praised by J. B. Say, by M'Culloch, and by Lord Macaulay; *Conversations on Natural Philosophy* (1819; 13th ed. 1858), and similar books on Botany (9th ed. 1840), Vegetable Physiology, &c., besides numerous charming *Stories for very Little Children*, in the estimation of many her best work. She died in London on 28th June 1858. See Harriet Martineau's *Biographical Sketches* (1869).

March (Slav. *Morava*), the principal river of Moravia, rises on the boundary between that country and Prussian Silesia, and flows 214 miles south to the Danube, which it joins 6 miles above Presburg. It receives on the right the Thaya. In its lower course it forms the boundary between Austria and Hungary. It is navigable for small boats from Göding, 50 miles from its mouth.

March, a market-town of Cambridgeshire, on the Nen, 14 miles E. of Peterborough and 16 NW. of Ely. Its church has a fine Perpendicular clerestory, with splendid roof. Pop. of parish (1851) 6241; (1881) 6190.

March, the first month of the Roman year, and the third according to our present calendar, consists of thirty-one days. It was considered as the first month of the year in England until the change of style in 1752, and the legal year was reckoned from the 25th March. Its last three days (old style) were once popularly supposed to have been *borrowed* by March from April, and are proverbially stormy.

March, a musical composition, chiefly for military bands, with wind-instruments, intended to accompany the marching of troops. There are slow and quick marches, and marches peculiar to different countries. Marches are also introduced into oratorios, the best-known examples being the 'Dead March' from the oratorio of *Saul*, and Mendelssohn's 'Wedding March.'

Marchantia. See LIVERWORT.

Marchena, a town of Spain, 47 miles by rail E. by S. of Seville, with a ducal (Arcos) palace, and sulphur-baths. Pop. 13,768.

Marches, the border districts that run contiguous on each side of the boundary line between England and Scotland, and between England and Wales. The Lords of the Marches were the nobles to whom estates on the borders were given, on condition that they defended the country against the aggressions of the people on the other side. Under the Norman and Plantagenet kings of England there was almost chronic war between the English Lords of the Marches and the Welsh. For the Scottish-English Marches, see BORDERS.—The Mortimers, Earls of March, took their title from March in Cambridgeshire.—The corresponding German word *Mark* was in like manner applied to the border countries or districts of the German empire, conquered from neighbouring nations—the marks of Austria, of Brandenburg, Altmark, Steiermark, &c. The governors entrusted with the charge of these marks were called mark-grafs or margraves, corresponding to the English and Scottish Wardens of the Marches (see MARQUIS). The ancient German tribe of *Marcomanni* were 'Marchmen.' In Italy *The Marches* include the march of Ancona (q.v.) and three other provinces (see ITALY).

Marchetti, FILIPPO, an operatic composer, born at Rome in 1835, became in 1881 president of a musical college in Rome. His best-known operas are *Romeo e Giulietta* (1865) and *Ruy Blas* (1869).

Marcianisi, an agricultural town of Italy, situated in a marshy district, 12 miles by rail N. of Naples. Pop. 11,083.

Marcion, the founder of the Marcionites, a rigorously ascetic sect which attained a great importance between the years 150 and 250 A.D. He was a native of Sinope in Pontus, became wealthy as a shipowner, and about 140 repaired to Rome. There he laboured to correct the prevailing views of Christianity, which he considered to be a corruption of Jewish errors with the gospel of Christ as expounded by Paul, its best interpreter. The opposition which he encountered drove him to found a new community about 144, and he laboured earnestly propagating his theology until his death about 165. Marcion was hardly a Gnostic, although he had been intimate with Cerdo, and Gnostic speculations certainly influenced the development of the Marcionite theology. Failing to recognise the New Testament God of love in the Old Testament, and profoundly influenced by the radical Pauline antithesis of law and gospel, he constructed an ethico-dualistic philosophy of religion, and proceeded to cosmological speculations which are not free from contradictions. He set aside as spurious all the gospels save Luke, and it, as well as the Pauline epistles, he purged of Judaising interpolations. He was thus the earliest to make a canonical collection of New Testament writings. From about the beginning of the 4th century the Marcionites began to be absorbed in the Manichæans. Marcion's doctrines can be discovered from the controversial writings of Fathers, as Tertullian, Hippolytus, Epiphanius, &c. See works of Baur, Möller, Lipsius, and Harnack quoted under GNOSTICISM.

Marco Polo. See POLO.

Mardi Gras. See SHROVE-TIDE.

Mardin, a town of Asiatic Turkey, is strikingly situated on the southern slopes of the Mardin Hills, 60 miles SE. of Diarbekir. Pop. 12,000, of whom half are Moslem Kurds.

Maree, LOCH, a beautiful lake of Ross-shire, 40 miles W. of Dingwall. Lying 32 feet above sea-level, it is 12½ miles long, 3 furlongs to 2¼ miles broad, 360 feet deep, and 11 sq. m. in area. It is overhung by mountains, 3000 feet high; sends off the Ewe, 3 miles long, to the sea; and contains twenty-seven islets, one with remains of an ancient chapel and a graveyard. Queen Victoria's residence at Loch Maree in 1877 is described in her *More Leaves* (1884).

Maremma (corrupted from *Maritima*, 'situated on the sea'), a marshy region of Italy, extending along the sea-coast of Tuscany from the river Cecina to Orbitello, and embracing an area of about 1000 sq. m. The Pontine Marshes and the Campagna of Rome are similar districts. In Roman times and earlier the Maremma was a fruitful and populous plain; but the decay of agriculture, consequent upon unsettled political history, fostered the encroachments of malaria, which now reigns supreme in great part of these stricken districts. Leopold II. of Tuscany directed especial attention (1824–44) to the drainage and amelioration of the Maremma, and his efforts and subsequent measures

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have been attended with considerable success. Crops are now grown in the summer on the fertile soil of the infected area by the inhabitants of the adjoining hill-country, who go down only to sow and to reap their crops. During winter the Maremma is healthier and yields good pasture.

Marengo, a village of Northern Italy, in a marshy district near the Bormida, 3 miles SE. of Alessandria. Here on 14th June 1800 Napoleon, with 33,000 French, defeated 30,500 Austrians under Melas. It was the cavalry charge of the younger Kellermann that turned what looked like certain defeat into a decisive victory, though the French lost 7000 in killed and wounded, the Austrians only 6400 (besides 3000 prisoners).

Mareotis, or MAREIA, LAKE, the modern *El Mariût*, a salt lake or marsh in the north of Egypt, extends southward from Alexandria, and is separated from the Mediterranean, on its north-west side, by a narrow isthmus of sand. In the 15th and 16th centuries it was a navigable lake; in 1798 it was found by the French to be a dry sandy plain; but in 1801 the English army cut the dikes of the canal that separated the Lake of Aboukir from Mareotis, to cut off the water-supply of the French, and Mareotis became once more a marsh. The like happened again in 1803, in 1807, and in 1882; on the last occasion the sea was introduced directly through a cutting 15 feet wide and half a mile long.

Mare's Milk. See KOUMISS.

Mare's Tail (*Hippuris vulgaris*), a tall erect marsh-plant, with whorls of narrow leaves and inconspicuous flowers.

Margaret, ST, Scottish queen, was born about 1047 in Hungary, and from 1057 was brought up at the court of her great-uncle, Edward the Confessor, with Lanfranc for her spiritual instructor. In 1068, with her mother and sister and her boy brother, Edgar the Atheling (q.v.), she fled from Northumberland to Scotland. Young, lovely, learned, and pious, she won the heart of the rude Scottish king, Malcolm Canmore (q.v.), who next year wedded her at Dunfermline. 'Perhaps,' says Skene, 'there is no more beautiful character recorded in history than that of Margaret. For purity of motives, for an earnest desire to benefit the people among whom her lot was cast, for a deep sense of religion and great personal piety, for the unselfish performance of whatever duty lay before her, and for entire self-abnegation she is unsurpassed.' She did much to civilise the northern realm, and still more to assimilate the old Celtic church to the rest of Christendom on such points as the due commencement of Lent, the Easter communion, the observance of Sunday, and marriage within the prohibited degrees. She built, too, a stately church at Dunfermline, and re-founded Iona. She bore her husband six sons and two daughters, and died three days after him, in Edinburgh Castle, on 16th November 1093. Innocent IV. canonised her in 1250. Her head, which had found its way from Dunfermline to Douay, was lost in the French Revolution; but her remaining relics are said to have been enshrined by Philip II. in the Escorial.

See the Latin Life by her confessor Turgot, Bishop of St Andrews (Eng. trans. by Fr. Forbes-Leith, 1884); Skene's *Celtic Scotland* (vol. ii. 1877); and Belleaheim's *History of the Catholic Church of Scotland* (Eng. trans. 1887).

Margaret, the 'Semiramis of the North,' queen of Denmark, Norway, and Sweden, was the second daughter of Waldemar IV. of Denmark, and wife of Hacon VIII. of Norway, and was born in 1353. On the death of her father without male heirs in 1375, the Danish nobles offered her the crown in trust for her infant son Olaf. By the death of Hacon in 1380 Margaret became ruler of Norway as well as of Denmark. When Olaf died in 1387 Margaret nominated her grand-nephew, Eric of Pomerania, as her successor. The Swedish king, Albert of Mecklenburg, having so thoroughly alienated the affections of his subjects that the nobles, declaring the throne vacant, offered in 1388 to acknowledge Margaret as their ruler, she sent an army into Sweden, which defeated the king's German troops, near Falköping, and took Albert and his son prisoners. Albert remained in prison seven years, during which time Margaret, in spite of the efforts of the Hanseatic League and its allies, wholly subjugated Sweden. In the following year (1396) Eric of Pomerania was crowned king of the three Scandinavian kingdoms, and though he was proclaimed king *de facto* next year, the power still remained in the hands of Margaret. In May 1397 was signed the celebrated Union of Calmar, by which it was stipulated that the three kingdoms should remain for ever at peace under one king, though each should retain its own laws and customs. Before her death at Flensborg, on 28th October 1412, Margaret had enlarged the territories she held for her grand-nephew by the acquisition of Lapland and part of Finland. She was a woman of masculine energy and strong will, and ruled her subjects with a firm hand.

Margaret of Anjou, the queen of Henry VI. of England, was daughter of René of Anjou, the titular king of Sicily, and of Isabella of Lorraine, and was born at Pont-à-Mousson, in Lorraine, 24th March 1429. She was married to Henry VI. of England in 1445; and her husband being a person whose naturally weak intellect was sometimes darkened by complete imbecility, she exercised an almost unlimited authority over him, and was the virtual sovereign of the realm. A secret contract at her marriage, by which Maine and Anjou were relinquished to the French, excited great dissatisfaction in England, and the war with the French which broke out anew in 1449, in the course of which all Normandy was lost, was laid by the English to the charge of the already unpopular queen. In 1450 occurred the insurrection of Jack Cade, and soon after the country was plunged in the horrors of that bloody civil war known as the Wars of the Roses. Margaret took an active part in the contest, braving disaster and defeat with the most heroic courage. At length, after a struggle of nearly twenty years, Margaret was finally defeated at Tewkesbury, and flung into the Tower, where she remained four years, till Louis XI. redeemed her for fifty thousand crowns. She then retired to France, and died at the château of Dampierre, near Saumur, in Anjou, 25th August 1482. Mrs Hookham's *Life* (1872) is not altogether satisfactory as history.

Margaret of Navarre, in her youth known as Marguerite d'Angoulême, sister of Francis I. of France, and daughter of Charles of Orleans, Comte d'Angoulême, was born at Angoulême, 11th April 1492. She was carefully educated, and early showed remarkable sweetness and charm added to unusual strength of mind. In 1509 she was married to Charles, Duke of Alençon, who died in 1525; and in 1527 she was married to Henri d'Albret, titular king of Navarre, to whom she bore Jeanne d'Albret, mother of the great French monarch, Henry IV. She encouraged agriculture, the arts, and learning, and sheltered with a courageous generosity such advocates of freer thought in religion as Marot and Bonaventure des Périers. Accusations entirely unfounded have been brought by interested bigotry against her morals. She died 21st December 1549. Her writings include a series of remarkably interesting Letters (ed. by Génin,

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2 vols. 1842–43), a miscellaneous collection of poems gracefully entitled *Les Marguerites de la Marguerite* (ed. by Frank, 4 vols. 1873), and especially the famous *Heptaméron des Nouvelles* (1558; ed. by Leroux de Lincy, 3 vols. 1855), modelled on the *Decameron* of Boccaccio, but worked out in an original manner. A company of ladies and gentlemen returning from Cauterets are detained by bad weather, and beguile the time by telling stories, seventy-two in number, which are separated by interludes introducing the persons. The subjects of the stories are similar to those of the *Decameron*, but the manners delineated are more refined; and they reflect closely the strange combination of religious fervour with religious free-thinking and refined voluptuousness so characteristic of the time. Most critics believe the work to be the joint-production of the queen, of Des Périers, and other men. See Lives by Durand (Paris, 1848), Miss Freer (London, 1854), and Lotheisen (Berlin, 1885).

Margaric Acid was formerly thought to be a separate body, but is now known to be a mixture of palmitic and stearic acids. It is obtained from fats.

Margarine, or OLEO-MARGARINE. See the paragraph on Butterine in the article BUTTER.

Margarita, an island in the Caribbean Sea, belonging to Venezuela. Area, 380 sq. m. Discovered by Columbus in 1498, Margarita was long famous for its pearl-fisheries, but now its chief export is salted fish. The island forms the great part (the small Blanquilla, Los Hermanos, &c. make the rest) of the *Nueva Esparta* section of Guzman Blanco state, of which the pop. in 1886 was 41,893.

Margary, AUGUSTUS RAYMOND, traveller, was born 26th May 1846, at Belgaum, in the presidency of Bombay, the son of an English officer. Educated in England at Brighton College and University College, London, he qualified for a student-interpretership in China, and went out in 1867. During the next six years he served at Peking, in Formosa, at Chefoo, and at Shanghai. In August 1874 he was ordered to cross south-west China to Burma to meet a British mission under Colonel Browne, the object of which was to open the overland route between Burma and China. Margary was to act as interpreter and guide to the mission. He successfully accomplished the perilous journey, and set out back again with Colonel Browne, but was murdered by the Chinese at a place called Manwyne on 21st February 1875. The Journals and Letters of his journey, together with a biographical preface, and a concluding chapter by Sir Rutherford Alcock, were published in 1876.

Margate, a seaport and municipal borough of England, in the Isle of Thanet, Kent, 3 miles W. of the North Foreland and 74 E. by S. of London, has for many years been the favourite seaside resort of cockney holiday-makers, who, during the season, by rail and by steamer, pour into the town in their thousands. Possessed of many natural advantages in its bracing air, good bathing, and excellent firm sands, Margate offers besides all the customary attractions of a watering-place, with its pier (900 feet long), jetty (upwards of a quarter of a mile in length), theatre, assembly-rooms, baths, zoological gardens, &c. It contains also two interesting churches—one exhibiting traces of Norman and Early English work, and the other with a tower of 135 feet, forming a conspicuous landmark; the Royal Sea-bathing Infirmary, founded 1792 and enlarged 1882; a town-hall (1820); and an extensive deaf and dumb asylum (1875–80–86). Formerly the port was the scene of the embarkation or landing of many royal and other persons, amongst the latter being the wounded brought back from the field of Waterloo. Queen Victoria visited the town in 1835, where too for a short time Turner the painter (one of whose earliest known sketches is a view of Margate church) was at school. Pop. (1801) 4766; (1881) 18,226.

Margaux, a village 15 miles by rail NNW. of Bordeaux, near the left bank of the Gironde, with a number of white villas, half-hidden amidst trellised vines. The château (a handsome Italian villa) and its celebrated vineyards are half a mile distant. Pop. 1619.

Margay (*Felis tigrina*), a species of cat or tiger-cat, a native of the forests of Brazil and Guiana, smaller and less handsome than the ocelot, which in general appearance it much resembles, though its spots are smaller. It is little larger than the domestic cat. It is capable of domestication, and of being made very useful in rat-killing.

Marghilan, capital of Ferghana (q.v.).

Marginal Credits, a term applied to business operations, in which bankers lend the credit of their names, as it were, to their customers, and thus enable them to carry out important commercial transactions which otherwise could not be so conveniently undertaken. A merchant in England, for instance, desires to import tea or silk, but his name is not so well known on the Chinese Exchanges that bills drawn upon him by a merchant in China can be sold there at a reasonable rate of exchange. The tea or silk cannot be purchased without the money being on the spot to buy it with, and were the merchant to send out specie for that purpose he would involve himself in heavy charges for freight and insurance, and lose the interest of his money while on the voyage. Moreover, before the remittance (silver probably) could arrive, the market prices of tea and silk might have so altered that a purchase might not be desirable, and the money would thus be placed where it was not wanted. But, while drafts by the merchant in China on the merchant in England would not sell, or only at a heavy sacrifice, the drafts by the merchant in China on a banker in England will sell at the best price. The merchant in this country therefore deposits with his banker cash or securities equal to the amount to which he desires to use the banker's name, and receives from him *Marginal Credits* for the amount. These are bill-forms drawn upon the banker, but neither dated nor signed, with a margin containing the banker's obligation to accept the bills when presented. The bills are dated, drawn, and endorsed by the merchant abroad before being sold, so that the obligation runs from the date on which the money was actually paid; and the tea or silk is most likely in the merchant's warehouse before the bill is payable. For the transaction, the banker charges the merchant a commission to remunerate himself for the risk involved. In recent years the use of marginal bills has largely fallen off in consequence of the development of electrical communication. Merchants now prefer to arrange with their bankers for a 'telegraphic transfer,' by which an immediate cash payment is effected through a foreign bank.

Many transactions between merchants abroad and in England can only be carried through by the acceptances of a London banker being tendered in payment, but the transactions are intrinsically the same as when Marginal Credits are used. Bankers in the country obtain the acceptance of a London banker for bills to be drawn against goods their customers are importing. Bankers—usually in London—also accept bills to a great amount for the exchange operations of foreign banks. A banker in, say Canton, buys from his customers bills drawn upon merchants in England for a given amount, and sends them to his corre-

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spondent in London, who holds them for him and grants a credit in his favour on the security of them. The Canton banker operates upon this credit by drawing upon the London banker, and sells his drafts at the most favourable exchange. With the money received he purchases other bills, and remits them also, to be again drawn against. When these operations are made with caution and sound judgment they are beneficial to all concerned; but when engaged in without sufficient knowledge or recklessly they involve most disastrous consequences.

Margrave. See MARCHES, MARQUIS.

Marguerite. See MARGARET.

Marguerite. See CHRYSANTHEMUM.

Marheineke, PHILIPP CONRAD, Protestant theologian, born at Hildesheim on 1st May 1780, began to teach at Göttingen in 1804, was appointed a theological professor and university preacher at Erlangen in 1805, and subsequently held theological chairs at Heidelberg (from 1807) and Berlin (from 1811). He died on 31st May 1846. After Hegel's death Marheineke was the chief figure among the right wing of that philosopher's disciples. His Hegelian views found expression in *Grundlehren der Dogmatik* (2d ed. 1827) and *Vorlesungen über die Christliche Moral, Dogmatik*, &c. (4 vols. 1847–49). He also wrote *Geschichte der deutschen Reformation* (4 vols. 2d ed. 1831–34), *Institutiones Symbolicæ* (3d ed. 1830), *System des Katholizismus in seiner symbolischen Entwickelung* (3 vols. 1810–13), and other works.

Maria Christina, queen of Spain, born at Naples, 27th April 1806, was a daughter of Francis I., king of the Two Sicilies. In 1829 she became the fourth wife of Ferdinand VII. of Spain, and in October of that year gave birth to a daughter, Isabella II. Ferdinand died 29th September 1833, and by his testament his widow was appointed guardian of her children—the young Queen Isabella and the Infanta Maria Louisa, Duchess de Montpensier—and also regent. A civil war broke out (see CARLISTS); but the queen-mother seemed indifferent to everything except the company of Don Fernando Muñoz, whom she made her chamberlain, and with whom she was united, in December 1833, in a morganatic marriage. She had ten children by him. A conspiracy, which broke out on the night of the 13th August 1836, led the queen-mother to concede a constitution to Spain. In 1840 a popular commotion ensued, and she gave to the new prime-minister, Espartero, a renunciation of the regency, and retired to France, whence she returned in 1843. Her participation in the schemes of Louis-Philippe as to the marriage of her daughters in 1846, and the continual exercise of her influence in a manner unfavourable to constitutional liberty, made her hateful to the patriotic party in Spain. At length, in July 1854, a revolution expelled her from the country, and she again took refuge in France, but returned to Spain in 1864, only to retire again in 1868. She died at Le Havre, August 1878. See CARLISTS, and SPAIN.

Maria Louisa, the second wife of Napoleon I., born 12th December 1791, was the daughter of the Emperor Francis I. of Austria. She was married to Napoleon after the divorce of Josephine, 2d April 1810. On 20th March following she bore a son, who was called King of Rome. At the beginning of the campaign of 1813 Napoleon appointed her regent in his absence, but under many limitations. On the abdication of Napoleon, not being permitted to follow him into exile, she went with her son to Schönbrunn, where she remained till 1816, when she received the duchies of Parma, Piacenza, and Guastalla. In 1822 she contracted a morganatic marriage with Count von Neipperg. She died at Vienna, 17th December 1847.

See Lives by Helfert (1873) and Imbert de Saint-Amand (Eng. trans. 1886), her *Correspondance* (1887), and the *Mémoires* of Mme. Durand, her maid of honour (1885).

Mariana, JUAN, a Spanish historian, was born at Talavera in 1536, entered at eighteen the then rising order of the Jesuits, and afterwards taught in the Jesuit colleges at Rome (where Bellarmine was one of his scholars), in Sicily, and finally in Paris. After seven years of labour in Paris he was driven by ill-health to Toledo, and there he lived in unbroken literary labours till his death, at an extreme old age, in 1624. His *Historiæ de Rebus Hispaniæ* first appeared in 20 books in 1592, and was supplemented by 10 additional books, carrying the narrative down to the accession of Charles V., in 1605. Its admirable Latinity and undoubted historical merits give it an abiding value. Mariana himself published a Spanish translation (1601–9), which still remains one of the classics of the language. His *Tractatus VII. Theologici et Historici* (1609) roused the suspicion of the Inquisition. But the most celebrated of the works of Mariana is his well-known treatise *De Rege et Regis Institutione* (1599), which raises the question whether it be lawful to overthrow a tyrant, and answers it in the affirmative, even where the tyrant is not a usurper but a lawful king. This tyrannicide doctrine drew much odium upon the entire order of Jesuits, especially after the murder of Henry IV. of France by Ravaillac in 1610; but it is only just to observe that, while, upon the one hand, precisely the same doctrines were taught in almost the same words by several of the Protestant contemporaries of Mariana, on the other, Mariana's book itself was formally condemned by the general Acquaviva, and the doctrine forbidden to be taught by members of the order.

Mariana Islands. See LADRONES.

Marianna, an episcopal city of Brazil, 3 miles E. of Ouro Preto. The neighbouring gold-mines are exhausted. Pop. 5000.

Marianus Scotus, an early Irish or Scottish chronicler, who, quitting his country in 1052, took the monastic vows as a Benedictine at Cologne in 1058, and then settled in the monastery at Fulda. Ten years later he removed to Mainz, where, and also at Ratisbon, he taught mathematics and theology. He died at Mainz in 1086, leaving a *Chronicon Universale*, which began at the creation and came down to the year 1083. It was published at Basel in 1559 and at Frankfort in 1613.

Maria Theresa, empress, the daughter of the Emperor Charles VI., was born at Vienna, 13th May 1717. By the Pragmatic Sanction (q.v.), for the fulfilment of which the principal European powers became sureties, her father appointed her heir to his hereditary thrones. In 1736 she married Francis of Lorraine, afterwards Grand-duke of Tuscany, to whom she gave an equal share in the government when, on the death of her father, 21st October 1740, she became queen of Hungary and of Bohemia, and Archduchess of Austria. At her accession the monarchy was exhausted, the finances embarrassed, the people discontented, and the army weak; whilst Prussia, Bavaria, Saxony, and Sardinia, abetted by France, put forward claims to the whole or to portions of her dominions. Frederick II. of Prussia claimed Silesia, and poured his armies into it; Spain laid hands on the Austrian dominions in Italy; and the Bavarians, assisted by the French, invaded Bohemia, and, passing on into the archduchy of Austria, threatened Vienna, the Elector of Bavaria

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being crowned king of Bohemia and emperor as Charles VII. (1742). The young queen was saved by the chivalrous fidelity of the Hungarians, to whose loyalty she appealed, with her infant son in her arms, in a stirring speech at the diet held in Presburg, and she was supported by the assistance of Britain, but most of all by her own resolute spirit. The war of the Austrian succession, after lasting more than seven years, was terminated by the peace of Aix-la-Chapelle in 1748. The empress-queen lost Silesia and Glatz to Prussia, the duchies of Parma, Piacenza, and Guastalla to Spain, and some Milanese districts to Sardinia. On the other hand, her titles were fully recognised, as well as that of her husband, who had been nominated emperor (1745), Charles of Bavaria having in the meantime died. During the years of peace that ensued Maria Theresa instituted important financial reforms, did her utmost to foster agriculture, manufactures, and commerce, and improved and nearly doubled the national revenues, whilst the burdens were diminished. At the same time she charged Marshal Daun to reorganise and rediscipline her armies. In Kaunitz (q.v.) she had a minister possessed of wisdom and energy, and in his hands she left for the most part the management of the foreign relations of the empire. But the loss of Silesia, especially the conduct of Frederick the Great, which had brought upon her that loss, rankled deeply in her mind; and, France having been gained as an ally through the address of Kaunitz, she renewed the contest with the Prussian king. But the issue of the Seven Years' War (q.v.) was to confirm Frederick in the possession of Silesia. On the conclusion of hostilities the empress renewed her efforts to promote the national prosperity, ameliorating the condition of the peasantry, mitigating the penal code, founding schools, organising great charitable societies, in short promoting the welfare of her subjects by all the wise arts of peaceful progress. Her son Joseph, elected king of the Romans in 1764, she associated, after the death of her husband (1765), with herself in the government of her hereditary states, but in reality committed to him the charge only of military affairs. She joined with Russia and Prussia in the first partition of Poland (1772), whereby Galicia and Lodomeria were added to her dominions. She also obtained from the Porte Bukowina (1777). On the death of the childless Elector of Bavaria Austria successfully asserted her claim to the 'quarter of the Inn' and one or two other districts. Maria Theresa died 29th November 1780. Personally a woman of majestic and winning appearance, she was animated by truly regal sentiments and an undaunted spirit; and by this rare union of feminine tact with masculine energy and restless activity, she not only won the affection and even enthusiastic admiration of her subjects, but she raised Austria from a most wretched condition to a position of assured power. Her reign marks the transition of Austria from a medieval to a modern state; and by her efforts the beginning was successfully made of fusing into one sovereignty the heterogeneous lands ruled over by the House of Hapsburg. Although a zealous Roman Catholic, Maria Theresa maintained the rights of her own crown against the court of Rome, and endeavoured to correct some of the worst abuses in the church. Of her ten surviving children, the eldest son, Joseph II., succeeded her; Leopold, Grand-duke of Tuscany, followed his brother on the imperial throne as Leopold II.; Ferdinand became Duke of Modena; and Marie Antoinette was married to Louis XVI. of France. See History by Arneth (10 vols. 1863–79, an Austrian version), other works by the same writer, by Duller, Ramshorn, and A. Wolf, the series begun by Duc de Broglie in 1882 (Eng. trans. 1883), and the works quoted under FREDERICK II.

Mariazell, the most famous place of pilgrimage in Austria, is situated in the extreme north of Styria, 25 miles N. of Bruck and 60 SW. of Vienna. It is visited by thousands of pilgrims annually, besides numerous visitors attracted by its romantic scenery. The image of the Virgin (brought here in 1157), the object of the pilgrimages, is enshrined in a magnificent church, built in 1644 on the site of an older one. Pop. 1065. Four miles from the village are important ironworks. *Guide* by Fruhwirth (1882).

Marie Am'elie, queen of Louis-Philippe (q.v.).

Marie Antoinette, JOSEPHE JEANNE, the most ill-fated among the queens of France, was born on the day of the great earthquake at Lisbon, 2d November 1755, the fourth daughter of Maria Theresa and the Emperor Francis I. From her cradle she was destined by her ambitious mother to be queen of France, and to that end was educated, although but indifferently, by the Abbé de Vermond. The marriage was negotiated by the Duc de Choiseul early in 1770, and took place on May 16, but was darkened a fortnight later by an ill-omened panic during the great fête of fireworks given in its honour by the city of Paris, in which some hundreds of people perished. The beautiful young dauphiness soon found her position full of difficulties, and the stiff and stately etiquette of the old French court wearied her to death. A mere child in years, married to a dull, decorous, and heavy husband, who was, moreover, for some years indifferent to her person, she found relief in a capricious recklessness of conduct and a disregard for conventions, and so from the commencement laid herself open to serious scandals for which there never was any real ground but her own indiscretion. Her night drives to Paris, her appearance at masked balls, her extravagance and undisguised love for the card-table, and her open favour to handsome and profligate young men, were misread into shameless immoralities, and she had lost her reputation long before she awoke to a sense of her responsibilities. In May 1774 the death of Louis XV. made her actual queen of France, and she soon deepened the distrust and dislike of her subjects by her undisguised devotion to the interests of Austria, as well as her thoughtless opposition to all the measures devised by Turgot and Necker for relieving the financial distress of the country. The miseries of France became in the popular imagination identified with the extravagant pleasures of the queen, and in the miserable affair of the Diamond Necklace her guilt was at once taken for granted, not only by Paris but the whole country, and 'the Austrian' became the object of the frenzied hatred of a starving people. The act of accusation against Calonne was in the eyes of the mob that of the court and of the queen. Showers of virulent pamphlets rained from all sides, and 'Madame Déficit' and 'Madame Veto' were some of the names in which a maddened people shrieked their hatred against their sovereign.

Meantime the joyous frivolity of the girl had changed into the courage and obstinacy of the woman who made herself a centre of opposition to all new ideas, and prompted the poor vacillating king into a retrograde policy to his own undoing. She was capable of strength rising to the heroic—as Mirabeau once said, the only man the king had about him was his wife. And she possessed the power of inspiring enthusiasm in all noble souls with whom she came into contact, as is evidenced by the personal influence she exercised over Fersen, Mirabeau, and Barnave. Amid the horrors of the march of women to Versailles (Octo-

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ber 5–6, 1789) she alone maintained her courage, and she showed herself on the balcony to the raging mob with a serene heroism that for a moment overawed the fiercest into respect. That same day the royal family and the Assembly left Versailles for Paris amid the plaudits of all the rascaldom of both sexes within the city. But Marie Antoinette lacked consistency even in the part she essayed to play, and to the last she failed to understand the nature of the troublous times into which she had been flung. She had an instinctive abhorrence of the liberal nobles like Lafayette and Mirabeau, and, if she professed to consult them, she also consulted with other men, and refused to trust them altogether. Again the indecision of Louis and his dread of civil war hampered her plans, and the intrigues of the emigrés did her cause more harm than all her domestic enemies together.

The queen was at length prevailed on by Count de Mercy-Argenteau, at the instigation of Count de la Marck, to make terms with Mirabeau, and she gave the great tribune an interview at Saint-Cloud, July 3, 1790. But she was too self-willed and independent frankly to follow his advice, for she abhorred his dream of a constitutional monarchy based on the free consent of an enfranchised people. His death in April 1791 removed the last hope of saving the monarchy, and less than three months later occurred the fatal flight to Bouillé at the frontier, intercepted at Varennes, against which Mirabeau had ever pleaded as a fatal step. The storming of the Tuileries and slaughter of the brave Swiss guards (10th August 1792), the transference to the Temple, the trial and execution of the king (21st January 1793), quickly followed, and ere long her son was torn from her arms, and she herself sent to the Conciergerie like a common criminal (2d August 1793). After eight weeks more of sickening insult and brutality, the 'Widow Capet' was herself arraigned in her ragged dress and gray hair before the Revolutionary Tribunal. Under the torture of her trial she bore herself with the calm dignity and resignation of the martyr: one truthful touch stands out with infinite pathos across the century between—'she was sometimes observed moving her fingers, as when one plays on the piano.' Her answers were short with the simplicity of truth: 'You persist, then, in denial?'—'My plan is not denial: it is the truth I have said, and I persist in that.' One charge unspeakable in its infamy was tendered by Hébert, which he had got her wretched son aged eight years to sign. 'A mother can make no answer to such questions; I appeal to every mother here present,' was her only reply. A deep murmur ran through the court—'Miserable fool,' said Robespierre, 'he will make our enemies objects of compassion.' After two days and nights of questioning came the inevitable sentence, and on the same day, October 16, 1793, she left the world and all its madness behind her, under the axe of the guillotine. It was just three-and-twenty years since she had left Vienna amid universal grief, in all the brightness of beauty and hope.

See the Histories of the French Revolution by Thiers, Mignet, Michelet, Louis Blanc, Carlyle, Von Sybel, and H. Morse Stephens *passim;* also Madame Campan's *Mémoires sur la Vie privée de Marie Antoinette* (1823); De Lescure's *La vraie Marie Antoinette* (1863); D'Hunolstein's *Correspondance inédite de Marie Antoinette* (1864); and Feuillet des Conches' *Louis XVI., Marie Antoinette, et Madame Élizabeth, Lettres et Documents inédites* (1865). These, while valuable, all contain many unauthentic letters: the most reliable work is that by Arneth and Geffroy, *Marie Antoinette: Correspondance secrète entre Marie-Thérèse et le Comte de Mercy-Argenteau* (3 vols. 1874). Good books are also the elaborate studies by M. P. de Nolhac (1890) and M. de la Rocheterie (2 vols. 1890); and for the affair of the Diamond Necklace, G. C. D'Est Ange's *Marie Antoinette et le Procès du Collier* (1889). For an account of her portraits, about 500 in number, see Lord Ronald Gower's *Iconographie de Marie Antoinette* (Paris, 1883); and for the closing scenes in her life, Campardon's *Tribunal Révolutionnaire* (vol. i.) and *Marie Antoinette à la Conciergerie* (1863), Lord Ronald Gower's *Last Days of Marie Antoinette* (1885), and L. de Saint-Amand, *Les derniers Années de Marie Antoinette* (1889).

Marie de France, a poetess of whom but little is known with any degree of certainty, save that she lived in England under Henry III., and translated into French from an English version of a Latin translation of the Greek the *Ysopet*, a collection of 103 moralised fables, in octosyllabic couplets, 'for the love of Count William' (supposed to be William Longsword of Salisbury). These fables are natural and happy, as well as graceful in versification, and give their authoress a place in that line of descent which ended with La Fontaine. But her greatest work was the twelve (or fourteen) *Lais*, delightful and genuinely poetic narrative poems, mostly amatory in character, in octosyllabic verse, the longest nearly twelve hundred lines, the shortest just over a hundred. The word *Lai* is of Breton origin, and most probably referred originally to the style of music with which the harper accompanied his verse. The titles of Marie's *lais* are *Guigemar, Equitan, Le Fraisne, Bisclavret, Lanval, Les Dous Amanz, Yonec, Laustic, Milun, Chaitivel, Chievrefoil, Eliduc;* and to these most add *Graalent* and *L'Espine*. Of the *lais* the best edition is that of Karl Warnke (Halle, 1885), forming vol. iii. of Suchier's *Bibliotheca Normannica*, enriched with invaluable comparative notes by Reinhold Köhler. They were paraphrased rather than translated by the late Mr O'Shaughnessy as *Lays of France* (1872). A third work sometimes ascribed to Marie is a poem of 2300 verses on the purgatory of St Patrick. The best edition of the lays and fables together is that of Roquefort (2 vols. 1820).

Marie de' Medici, wife of Henry IV. of France, was the daughter of Francis I., Grand-duke of Tuscany, and was born at Florence, 26th April 1573. She was married to Henry, 16th December 1600, and in the following September gave birth to a son, afterwards Louis XIII. The union, however, did not prove happy. Marie was an obstinate and passionate woman, and her quarrels with the king soon became the talk of Paris. She was wholly under the influence of her favourites, Leonore Galigaï and her husband Concini, and was by them encouraged in her dislike to her husband. The murder of Henry (May 14, 1610) did not greatly grieve her, although it is not true that she was privy to the plot. For the next seven years she governed as regent, but proved as worthless a ruler as she had been a wife. After the murder of Concini (24th April 1617), whom she had created Marquis d'Ancre, a domestic revolution took place, and the young Louis XIII. assumed royal power. The queen was confined to her own house, and her son refused to see her. Her partisans tried to bring about a civil war, but their attempts proved futile; and by the advice of Richelieu, then Bishop of Luçon, she made her submission to her son in 1619, and took her place at court. Marie hoped to win over Richelieu to her party, but she soon found out that he had no mind to be ruled by her, whereupon she tried to undermine his influence with the king. Her intrigues for this purpose failed; she was imprisoned in Compiègne, whence she escaped and fled to Brussels in 1631. Her last years were spent in utter destitution, and she is said to have died in a hayloft at Cologne, 3d July 1642. She loved the

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fine arts, and Paris owes to her the Luxembourg. See the Life by Miss Pardoe (2d ed. 3 vols. 1852).

Marie Galante, a French island in the West Indies, discovered by Columbus in 1493, lies 17 miles SE. of Guadeloupe. Area, 58 sq. m. It is covered for the most part with wood, and surrounded by coral reefs. Sugar, coffee, cocoa, and cotton are exported. Pop. 15,000. Chief town, Grandbourg, or Marigot, on the south-west coast.

Marienbad, one of the most frequented of the Bohemian spas, 47 miles by rail NW. of Pilsen, at an elevation of 2057 feet above sea-level. The springs have long been used by the people of the vicinity, but it is only since 1807–8 that it has become a place of resort for persons from distant parts of the world. The springs are numerous, varying in temperature from 48° to 54° F. They are saline, containing sulphate of soda and various alkaline ingredients, but differing considerably in their composition and qualities. They are used both internally and in the form of baths. Great quantities of the waters of some of the springs are exported to distant places. Marienbad is surrounded by wooded heights, has a population of 2009, and is visited every season by upwards of 14,000 patients. See Fraser Rae's *Austrian Health Resorts* (1888).

Marienberg, a mining town of Saxony, 38 miles SW. of Dresden. Pop. 6139.

Marienburg, an old town of Prussia, on the Nogat, 30 miles by rail SSE. of Danzig. It was long the seat of the Grand Masters of the Teutonic Order (q.v.), who removed from Venice hither in 1309. The fortress of the Knights, however, was founded here about 1274. Marienburg remained in their hands till 1457, when it was taken by the Poles, and by them it was held till 1772. The castle, in which seventeen Grand Masters resided, a noble edifice in a style of Gothic peculiar to the vicinity of the Baltic, was thoroughly restored in 1817–42. Pop. (1875) 8538; (1885) 10,136. See works by Witt (1854) and Bergau (1871).

Marienwerder, a town of West Prussia, is picturesquely situated 3 miles E. of the Vistula and 55 by rail S. of Danzig. It was founded in 1233 by the Teutonic Knights, and has an old castle and a domkirche (1384). Pop. 8079.

Marietta, capital of Washington county, Ohio, on the Ohio River, 105 miles SE. of Columbus. Founded in 1788, it is the oldest town in the state, is the seat of Marietta College (1835), and has varied manufactures and a trade in the petroleum found near by. Remarkable traces of the earth-builders are visible here. Pop. (1890) 8308.

Mariette Pasha, FRANÇOIS AUGUSTE FERDINAND, Egyptian explorer, was born at Boulogne, 11th February 1821, and was educated at the municipal college of the town. He became French master at a school at Stratford-on-Avon in 1839, and in 1840 a pattern-designer at Coventry. But he soon returned to Boulogne, and after taking his degree at Douay (1841) was appointed professor at his native college. His connection with Nestor l'Hôte, the companion of Champollion, directed Mariette's attention to the hieroglyphic monuments; in 1849 he entered the Egyptian department of the Louvre, and in 1850 was despatched to Egypt in search of Coptic MSS. Whilst there he made his famous discovery of the Serapeum, the long-buried cemetery of the Apis bulls, and brought to light a host of important monuments and inscriptions in Memphis, Sakkara, Gizeh, and the neighbourhood. In 1858 he was appointed Keeper of Monuments to the Egyptian government, and thenceforward his life was devoted to archæological exploration in the Nile valley. With indefatigable industry he dug out the Sphinx and the temples of Dendera and Edfu, revealed the marvellous sculptures of Meydûm and Gizeh, and the courts and inscriptions of Medînet Habu, Deyr-el-Bahrî, Karnak, and Abydos, and began the excavation of Tanis, since pursued by the Egypt Exploration Fund. Nor was he less active with pen and pencil. In 1856–57 appeared his *Serapeum et Memphis* (also ed. Maspéro, 1882); four editions of his *Aperçu de l'Histoire d'Égypt* came out between 1864 and 1874, and six of the *Catalogue du Musée de Boulak* (which he founded in 1863, and which is full of the results of his labours) from 1864 to 1876; he published sumptuous descriptions in many volumes, with folio plates of the chief temples—*Dendérah* (1870–75), *Abydos* (1869–80), *Karnak* (1875), *Deir-el-Bahari* (1877), *Monuments Divers* (1872, ff.); while his *Itinéraire de la Haute Égypt* has been translated by his brother (*Monuments of Upper Egypt*, 1877), and his *Mastabas* edited by Maspéro (1882). Besides the Boulak (now Gizeh) Museum, which owes its existence to its first director, Mariette founded the French School of Egyptology and the Egyptian Institute. He was raised to the rank of a pasha in 1879; he died at Cairo, 19th January 1881, and was buried in the garden of his museum.

See E. Deseille, *Aug. Mariette* (1882); H. A. Wallon, *Notice*, Inst. de France (1883); A. B. Edwards, *Academy* (January 1881).

Marignano. See MELEGNANO.

Marigold, a name given to certain plants of the natural order Compositæ, chiefly of the genera Calendula and Tagetes. Pot Marigold (*Calendula officinalis*) is an annual, a native of France and the more southern parts of Europe, with an erect stem, 1 to 2 feet high, the lower leaves obovate on long stalks, and large, deep yellow flowers. It has long been very common in British gardens; there are varieties with double flowers. The whole plant has a slight aromatic odour and a bitter taste. It was formerly in great repute as a carminative, and was regarded also as an aperient and sudorific. The florets were the part used, and they were dried in autumn to be preserved for use. They are often employed to adulterate saffron, and sometimes for colouring cheese. They were formerly a frequent ingredient in soups, and are still so used in some parts of England. The genus Tagetes consists of annual and perennial herbaceous plants, natives of the warmer parts of America, although *T. erecta*, one of those most frequently cultivated in Britain, bears the name of African Marigold; and *T. patula*, another annual well known in British flower-borders, is called French Marigold. Both species are Mexican. They have been long in cultivation, are much admired, and require the assistance of a hotbed in spring in the colder parts of Britain. Corn Marigold is a Chrysanthemum (q.v.). Marsh Marigold (q.v.) has no botanical affinity with the true marigolds.

Marine Engine. See STEAM-ENGINE.

Marines, or the Royal Marine Forces, are that body of the military forces of the crown which is under the control of the Admiralty, for service in the navy. They were first raised in 1664, the original aim, since modified, being to form a nursery whence to obtain seamen to man the fleet. The commerce of England was then too limited to procure from out of the merchant fleet sufficient seamen for the public service; and, as those obtained by the system of impress were not easily amenable to discipline, the presence of some marines as disciplined troops had to be relied on to check or suppress the frequent tendency to mutiny. The force is now composed of two branches, with separate lists for the promotion of officers, styled respec-

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tively the Royal Marine Artillery and the Royal Marine Light Infantry. The artillery consists of one division quartered at Eastney, near Portsmouth; the uniform, blue with red facings, is almost identical with that of the land artillery. The infantry consists of three divisions, quartered at Portsmouth, Plymouth, and Chatham; their uniform, scarlet with blue facings, is much the same as that of the line regiments. The officers rank according to seniority with officers of like rank in the army, and are promoted by seniority up to the rank of major, beyond which promotion is governed by selection. The strength of the marine forces is now about 14,000. When serving on board ship they are employed as sentries, and keep regular watch like the blue-jackets when not on guard, assisting in all the duties of the ship, except going aloft; in action both the men of the marine artillery and of the light infantry are now stationed at the guns conjointly with the blue-jackets, those not employed at the guns being used as a rifle party on deck; they always form part of all naval brigades landed for service on shore. With a view to their efficient training in gunnery, batteries with heavy guns mounted as on board ship have been constructed at all the marine barracks, where the men are regularly drilled by qualified officers and instructors. All the marine artillery officers have to undergo a special course of training, and since 1887 probationary lieutenants for the light infantry have to pass through a course at Greenwich similar to those for the marine artillery, and after joining headquarters undergo a course of instruction in gunnery. Combining the handiness of the sailor with the training of the soldier, the marines are justly regarded as a most valuable body of men. Their officers can be called upon to sit on garrison courts-martial and to perform general garrison duties, such as field-officer of the day, &c.; but they mount no garrison guards, and, although they may be called upon by the general in command to take part in field-days and reviews, yet, being entirely under the Admiralty, they occupy a position quite distinct from the regular troops in garrison with them. Marines, like blue-jackets, have the privilege, which the army does not enjoy, of wearing their beards, in barracks as well as when afloat; and, like the blue-jackets, but again unlike the army, they remain a long-service corps. Under the short-service system, which obtains in the army, it would be impossible to give marines the necessary training; they are therefore engaged to serve for fourteen years, with the option of re-engaging for another seven years, when they obtain a pension. One result of this is that the Admiralty can always obtain an unlimited supply of recruits; they are thus able to carefully pick their men, and their standard is much higher than that of the line. For physique, soldierly training, and efficiency no regiment in the army, not even the Guards, can approach the Marine Light Infantry. The marine artillery are even more a picked corps than their brothers of the light infantry, and they require a higher educational standard; it is admitted that no other army in the world can put on parade so magnificent a body of men as the Marine Artillery Division. One of their battalions in line covers a third more ground than a corresponding line battalion. The bands of the Marine Artillery and Infantry Divisions are among the best military bands in the kingdom, being only, perhaps, surpassed by the bands of the Guards. The Marine Light Infantry takes precedence in the army immediately after the 50th regiment of foot.

The original number of marines was 1200. The third regiment of the line was called the Maritime Regiment, also the Admiral's Regiment. In 1702 the force of marines had increased to six regiments; from 1714 to 1739 no marine force existed; in the latter year it was reconstituted in six regiments, and in 1741 numbered ten. Once more disbanded in 1748, it was in 1755 placed wholly under the Admiralty. Subsequently, however, on the sudden expansion of the fleet for the wars with France, several line regiments were at times called upon to serve as marines. The land artillery was also represented in the bomb-vessels, and were so serving in 1804, when their duties were taken over by the Royal Marine Artillery, then first formed. This branch, more than once disbanded since then, according to the views of the Admiralty of the time, and even since 1870 again threatened with disbandment, is now recognised as a cheap, reliable, and most valuable reserve of specially-trained gunners. In the United States the marines serve five years, receiving $13 a month; if they serve beyond the five years they are paid $18 a month. See the *Historical Record of Royal Marine Forces*, by P. H. Nicolas (1845).

Marini, GIAMBATTISTA, an Italian poet, born at Naples in 1569. Abandoning jurisprudence for poetry against his father's will, he was befriended by various noble patrons, and was carried by Cardinal Pietro Aldobrandini to Turin, where a poem, *Il Ritratto*, procured him the office of ducal secretary. At Paris he enjoyed the patronage of Catharine of Valois, and after her death of Marie de' Medici. Here he wrote his best work, the *Adone* (1622), and after its publication revisited Italy, and died at Naples in 1625. The licentiousness that mars his verse was but an echo of his life. His imitators form the so-called Marinist school, of which the essential features are florid hyperbole and false overstrained imagery. See GONGORA, and LYLY.

Marino, a town on the Alban Hills, 12 miles SE. of Rome, has a castle belonging to the Colonnas, who took it from their rivals, the Orsinis, in 1424, and a cathedral and churches with pictures by Guido, Domenichino, and Guercino. It grows wine and manufactures soap, leather, &c. Pop. 6071.

Mario, GIUSEPPE, the famous tenor, was by birth the Cavaliere di Candia and son of General di Candia. He was born at Cagliari in 1808 (not at Genoa or Turin in 1812), and served in the army for some years. But a youthful escapade led to his forsaking Italy for Paris, where he quickly won his way into the most exclusive circles both by the charm of his manners and his exquisite voice. Having contracted debts, however, he accepted the appointment of first tenor of the Opera, with a salary of 1500 francs per month, changing his name at the same time from De Candia to Mario. After two years' study at the Conservatoire Mario made his début, on the 2d December 1838, as Robert in *Robert le Diable*, and achieved the first of a long series of operatic triumphs in Paris, London, St Petersburg, and America. His répertoire embraced all the great works of Rossini, Bellini, Donizetti, and Verdi. By the famous singer Giulia Grisi (q.v.) he was the father of six daughters. In private he was esteemed for his large-handed liberality and for his noble assistance to struggling artists. In his later years after his retirement from the stage he lost his fortune through disastrous speculations. In May 1878 a benefit concert in London yielded him as much as £1000. He died at Rome, 11th December 1883. See Engel's *Musical Celebrities* (1886).

Mariolatry. See MARY.

Marion, capital of Marion county, Ohio, 46 miles by rail N. of Columbus, with manufactures of machinery, farming implements, and wooden wares. Pop. (1890) 8308.

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Marionettes, little jointed puppets of wood or cardboard, representing men, women, and animals, and moved by means of cords or springs by a concealed agent. They are exhibited in what are called marionette theatres, the exhibiter varying his voice, so that a sort of dramatic performance is accomplished. This entertainment was known to the Greeks, and from them passed to the Romans. In modern times it has chiefly prevailed in Italy, where it was known as *Fantoccino*, and has there reached a very respectable degree of artistic perfection. It was carried to France under Charles IX. by an Italian named Marion, whence it passed quickly to England, where it became known as a *motion*, or *motion of puppets*, or *puppets* only. The favourite resort of puppet-plays in London seems to have been Bartholomew Fair, and in Elizabethan times they appear to have played set pieces. We find allusions so frequent as to prove wide popularity in Shakespeare, Ben Jonson, Pepys's *Diary*, Pope, Swift, and the Essayists. Marionettes are still exhibited occasionally, but the only very familiar marionette-play we have is the Punch and Judy of our streets. A marionette *Faust* had for many generations been played in Germany, and Goethe tells us that it gave him the first suggestion of his greatest work. In the East the players are very frequently Gypsies, and it is a striking fact that Gypsies still show marionettes in Germany, and already are spoken of as actors in Scotland in the 16th century.

Mariotte, EDME, a French physicist, born in Burgundy during the first half of the 17th century —the year is not known—was prior of St Martin-sous-Beaune, and died at Paris, 12th May 1684. He was one of the earliest members of the Academy of Sciences at Paris, and wrote original papers on percussion, the nature of air and its pressure, the movements of fluid bodies and of pendulums, on colours, &c. What is on the Continent called Mariotte's Law is rather Boyle's Law, and is an empirical law stated by Boyle (q.v.) in his *Defence of the Doctrine touching the Spring and Weight of the Air* (1662), and by Mariotte in his *Discours sur la Nature de l'Air* (1676). It is generally expressed as follows: *The temperature remaining the same, the volume of a given mass of gas is in inverse ratio to the pressure which it sustains.* This law may be held to be substantially correct within a considerable range of pressure; but see GASES. Mariotte's collected works were published at Leyden in 1717, and at The Hague (2 vols.) in 1740.

Mariposa, a central county of California, with the Sierra Nevada on its north-east border. It contains the Yosemite Valley (q.v.), besides a grove of giant trees (see SEQUOIA). Area, about 1600 sq. m.; pop. 4339.

Marischal. See MARSHAL, KEITH.

Marists, a modern French Catholic Congregation (q.v.). The Marist Fathers date from 1815; the Marist Brothers from 1817; and the Marist Sisters from 1834.

Maritime Province (*Primorskaya*), part of eastern Siberia, extending along the Pacific coast from the frontiers of Corea to the Arctic Ocean, and including Kamchatka and Saghalien. It has a length of 2300 miles, a very varying breadth, and the enormous area of 730,000 sq. m. (more than 3½ times the size of Germany). The variety of climate and productions is of course great. See AMUR, SIBERIA, KAMCHATKA, SAGHALIEN. The Maritime and Amur provinces are under one governor-general, whose headquarters are at Khabarovka.

Maritza (anc. *Hebrus*), a river of European Turkey, rises in the Balkans, and flows E. by S. past Philippopolis to Adrianople, where it bends and flows S. by W. to the Gulf of Enos in the Ægean. It is 270 miles long, and is navigable for small boats to Adrianople.

Mariupol, or MARIAMPOL, the seaport for the south Russian coalfield, stands on the Sea of Azov, 65 miles W. of Taganrog. It was founded in 1779 by Greek emigrants from the Crimea, and exports coal, wheat, linseed, &c. to the annual value of £425,000. Fish-curing, soap-boiling, and tanning are carried on. Pop. (1882) 14,980.

Marius, CAIUS, a famous Roman general who was seven times consul, was born of an obscure family at the village of Cereatæ, near Arpinum, 157 B.C. He served with great distinction at the siege of Numantia (134) under the younger Scipio Africanus, who is said to have hinted that in him the Romans would find a successor to himself. In 119 he was elected tribune of the plebs, and already he had made himself a great popular leader by his vigorous opposition to the nobles. In 114 he went to Spain as proprætor, and cleared the country of the robbers who infested it. He now married Julia, the sister of the father of the great Cæsar. He served in Africa as legate to Q. Cæcilius Metellus during the war against Jugurtha, and was elected consul two years after. He took for his province Numidia, and closed the Jugurthine war in the beginning of 106. The honour of capturing the beaten king fell to his quæstor L. Sulla, and from this period dates the birth of that jealousy out of which were to flow so many horrors. Meanwhile, an immense horde of Cimbri, Teutones, and other northern barbarians had burst into Gaul, and repeatedly defeated the Roman forces with great slaughter. Marius was again called to the consulate for the year 104, and for the third, fourth, and fifth time in the following years, 103–101, for it was felt that he alone could save the republic. The war against the Teutones in Transalpine Gaul occupied him for more than two years; but he finally annihilated them in a terrible battle of two days' duration at Aquæ Sextiæ, now Aix, in Provence, where 200,000—according to others, 100,000—Teutones were slain. After this he turned to the Cimbri in the north of Italy, and them he also overthrew at Campi Raudii near Vercellæ, with a like destruction (101). The people of Rome knew no bounds to their joy. Marius was declared the saviour of the state, the third founder of Rome, and was made consul for the sixth time in 100. It has often been remarked that, had he died at this period, he would have left behind him one of the greatest reputations in Roman history. But to perpetuate his power he stooped to the basest arts of the unprincipled demagogue.

When Sulla as consul was entrusted with the conduct of the Mithridatic war, Marius, who had long manifested an insane jealousy of his patrician rival, attempted to deprive him of the command, and a civil war began (88). Marius was soon forced to flee, and, after the most frightful hardships, and numerous hairbreadth escapes, he made his way to Africa. Two romantic incidents stand out among these days of peril. His place of hiding in the marshes of Liris had been discovered, and he had been flung into prison at Minturnæ, when a Cimbrian slave was sent to despatch him, 'Wretch, darest thou slay Caius Marius?' said the old hero as he glared upon him out of the gloom. The slave fled in terror saying, 'I cannot kill Marius,' and the citizens recognising the omen allowed the exile to escape. Scarcely had he reached the shore of Africa, when the Roman governor sent him a summons to leave the country. Said Marius, 'Go, tell the prætor that you have seen Caius Marius a

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fugitive, sitting on the ruins of Carthage.' Here he remained until a rising of his friends took place under Cinna. He then hurried back to Italy, and, along with Cinna, marched against Rome, which was obliged to yield. Marius was delirious in his revenge upon the aristocracy; a band of 4000 slaves carried on the work of murder for five days and nights. Marius and Cinna were elected consuls together for the year 86, but the former died after he had held the office seventeen days. On the triumph of Sulla his body, which had been buried, not burned, was torn from its grave on the banks of the Anio, and cast into the stream. Lucan tells us how the troubled ghost haunted the spot and scared the peasants from the plough on the eve of impending revolutions.

Marivaux, PIERRE CARLET DE CHAMBLAIN DE, was born at Paris, February 4, 1688. He belonged to a good Norman family and devoted himself to letters. He received but a slight education and in his early writings affected a disdain of the Greek and Latin authors, declaring, for example, that he preferred Gregory of Tours to Tacitus and Vincent Ferrier to Demosthenes. He published *L'Homère Travesti*, a burlesque of the *Iliad*, in 1716, and brought out his best comedy, *Le Jeu de l'Amour et du Hasard* in 1730. He received a pension from Helvétius, and another, of 1000 crowns a year, from Madame de Pompadour. His romance of *Marianne* came out in 11 parts between 1731 and 1741, but was never concluded by him, the twelfth part being added by Madame Riccomboni. He followed up his first dramatic success by numerous comedies: *L'Épreuve*, *Les Fausses Confidences*, *Le Legs*, *Les Sincères*, *La Méprise*, *Le Triomphe de l'Amour*, &c. They are the work of a clever analyst rather than a dramatist; the dialogue, says Sainte-Beuve, is a perpetual 'moral skirmish;' the writer sacrifices character and situation to an ingenious playing with words. Marivaux, said Voltaire, knew all the bypaths in the human heart, but he did not know the highway. He died at Paris, February 12, 1763. His title to fame rests on *Marianne*, one of the best novels of the 18th century. Its interest does not lie in exciting adventures, but in the subtle analysis of character and the delicate picturing of contemporary manners. From the peculiarities of Marivaux's finicking style the term *Marivaudage* was at one time current as a synonym for affected or 'precious' writing. His other romances, *Pharamond* and *Le Paysan parvenu*, are greatly inferior to *Marianne*. See Sainte-Beuve's *Causeries du Lundi IX.*, and Arsène Houssaye's *Galerie de Portraits du dix-huitième Siècle.*

Common Marjoram (*Origanum vulgare*).

Marjoram (*Origanum*), a genus of plants of the natural order Labiatæ. Several of the species are familiar as pot and sweet herbs in gardens. *O. vulgare* is the Common Marjoram, a native of Britain, and is aromatic with a bitter and slightly acrid taste. The dry leaves have been used instead of tea, and they are also used in fomentations. The tops of the plant have been used to dye woollen cloth purple; and, by a process of macerating the material first in alum water and then in a decoction of crab-tree bark, they also dye cotton cloth a reddish brown. *Oil of Marjoram* is obtained from this and other species by distillation. The oil of marjoram is so caustic as to be used by farriers as a stimulating liniment. A little cotton moistened with it placed in the hollow of an aching tooth relieves pain. *O. heracleoticum* is the Winter Sweet Marjoram of gardeners; *O. onites* is the Pot Marjoram; and the Knotted Marjoram is *O. Marjorana*. The dittany of Crete, a plant with round leaves clothed with thick white down and purple trailing stems, which is frequently cultivated as a window-plant in Britain, is *O. Dictamnus.*

Mark, the standard weight of the money system in various countries of Europe, especially in Germany, where in the middle of the 11th century the Cologne mark = half a Cologne pound, or 233·812 grammes, was adopted as the standard, and as such continued in use till 1857. The mark gradually acquired a monetary value as well; as such it has been since 1875 the standard of currency in the German empire, being equivalent to $\frac{1}{1395}$ of a pound (500 grammes) of fine gold, and equal to 11⅞d. English and 24 cents United States currency. But there are only 5, 10, and 20 mark pieces in gold. The silver mark (= ⅓ thaler) is divided into 100 pfennigs. The Lübeck mark or mark current, a coin formerly in use at Hamburg, was worth 1s. 2d.; the *mark banco* there, a money of account, was worth 1s. 6d. In England marks are first heard of in the treaty between Alfred and Guthrum the Dane, and are supposed to have been then a Danish reckoning. But these marks were not coins, only money of account, or rather a weight. In 1194 the coined mark had the nominal value it ever after retained, 160 pennies or 13s. 4d., two-thirds of the nominal 'pound.' The gold noble, first struck by Edward III., was worth half a mark—6s. 8d. As late as 1703 Defoe was fined 200 marks. In Scotland the mark or *merk* was a weight for gold and silver, or common money reckoning, and also a coin. The coin, like the other Scotch coins, had only one-twelfth of the English value: nominally 13s. 4d., it was worth 1s. 1¼d. English. There were two-merk, one-merk (4½ to the oz.), half, and quarter merk pieces. The French standard weight mark weighed 244·75 grammes and the Dutch mark 246·08 grammes.

Mark, a signature. See DEED, ILLITERATES.

Mark. See MARCHES.

Mark, also called JOHN (Acts, xiii. 5, 13), or, more fully, 'John, whose surname was Mark' (Acts, xii. 12, 25), is named by unvarying tradition from the close of the 2d century as the author of the second canonical gospel. Of Mary, his mother, nothing is known except that her house in Jerusalem was visited by Peter and the other disciples. Barnabas the Levite was his cousin (Col. iv. 10, R.V.). By some Mark has been supposed to be the young man mentioned in Mark, xiv. 51, 52, and it has also been conjectured that Mary's house may have been the place where the Lord's Supper was instituted. Mark accompanied Paul and Barnabas on their first missionary journey from Antioch in Syria as far as to Perga in Pamphylia (Acts, xii. 25; xiii. 13); here he quitted them on grounds which, whatever they may have been, did not approve themselves to Paul, who at a later date peremptorily declined to have him as a companion on his second journey, even though this involved his parting company with Barnabas also. That a reconciliation afterwards

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took place appears from Col. iv. 10; Phil. 24; 2 Tim. iv. 11, where Mark is referred to by the apostle as a useful fellow-worker. Another chapter in Mark's life is indicated in 1 Peter, v. 13, where he is mentioned as a companion of the apostle Peter in Babylon, unless indeed, as has been done by some interpreters, we take 'Marcus my son' in a literal sense, in which case, of course, a different person is referred to. We should not naturally think of interpreting Babylon here as meaning Rome, were it not for subsequent ecclesiastical tradition which usually speaks of Mark as the 'disciple and interpreter' of Peter, and mentions Rome as the scene of their labours till the martyrdom of the latter about 64 A.D. This tradition, in turn, is not easily brought into agreement with the very generally accepted statement of Eusebius, that Mark from Rome went to Alexandria, where, after proclaiming the gospel he had written, he was succeeded in the pastoral office by Ammianus in the eighth year of Nero (62 A.D.). This last date is given as his death year in the Roman breviary. A further tradition speaks of Mark as having preached in other parts of Italy besides Rome, and especially at Aquileia. On the strength of this tradition the Emperor Heraclius in 629 A.D. sent the patriarchal chair from Alexandria to Grado, whither the Aquileian patriarchate had previously been removed. The Venetian legend of the translation of the relics of St Mark from Alexandria to Venice (q.v.) in the 9th century is denied by Tillemont, and rests on very inadequate evidence. He is sometimes spoken of as having suffered martyrdom, but by none of the older authorities nor by the Roman breviary. His feast day is April 25. In medieval art Mark is symbolised by the lion. Various New Testament books have been attributed to him by individual modern critics (Epistle to Hebrews, Epistle of Jude, and, more recently, the Apocalypse, in whole or in part). For the traditions, both earlier and later, regarding Mark, see Molinus, *De Vita et Lipsanis S. Marci Evangelistæ* (Rome, 1864).

THE GOSPEL ACCORDING TO MARK.—Two distinct accounts of the origin of this gospel, both of them developments from earlier tradition, were formulated respectively by Augustine and by Jerome; both gained general currency throughout the Western Church, and no difficulty with regard to either of them was expressed for many centuries. Augustine's view (see GOSPELS) was that Mark merely followed and abridged Matthew, Jerome's that he wrote at the direct dictation of Peter. Modern criticism accepts neither. (1) The germs of Augustine's account are found in Irenæus (end of 2d century), who says that Matthew had already written his gospel before Mark began his, and in Clement of Alexandria (*circa* 210 A.D.), who has it that the two gospels containing the genealogies were composed first, and implies that Mark had seen them both. Mark's dependence on Matthew was first controverted towards the end of the 18th century (Koppe, Storr), and his priority to both Matthew and Luke was argued for and illustrated with much cogent detail by Wilke and Weisse in two independent works in 1838. Baur and his school continued to defend the traditional view so far at least as to maintain that the second gospel was a late conciliatory combination of Matthew and Luke, with the Ebionitism of the one and the Paulinism of the other left out. But Ewald again claimed priority for Mark, and his view, supported at the time by Ritschl and by many others since, may now be regarded as, subject to certain qualifications, generally accepted on all hands. Among the considerations that have led to this conclusion are certain peculiarities of language and phraseology in which Mark is confessedly less refined and classical than Luke or even Matthew. It is held to be unlikely that in course of borrowing the more vulgar style of expression should be substituted for the more polite. Again, the graphic, vivid, and abrupt style of Mark (characterised by use of the historical present and by other features) is not that of a mere abbreviator or copyist. Further, the progress of the narrative, which materially differs from that in Matthew and in Luke, is now held to represent, probably, the actual order of the facts more nearly. The natural course of a gradual development in the life and work of Jesus, in his own self-consciousness, and in the estimation of others, can be traced more clearly in Mark than in any of the other gospels. The manner and degree in which the supernatural element is presented are also held to betoken the earlier narrative. Certain expressions too, which might be supposed stumbling to faith, are present in Mark, but absent from the others, having either been struck out altogether or modified so as to bring them more into accordance with accepted views. (Compare, e.g., Mark, vi. 5 with Matt. xiii. 58; also Mark, i. 32–34 with Matt. viii. 16 and Luke, iv. 40, 41.) In short, its naïveté, directness, and simplicity prove the comparative originality of Mark. (2) Jerome's account can be traced back in its beginnings to Papias (*circa* 140 A.D.), who we learn from Eusebius was once told by John 'the presbyter' (not the apostle John), perhaps about 90 A.D., that 'Mark, having become the interpreter of Peter, wrote down accurately everything he remembered of the things that were either said or done by Christ, not, however, in order. For neither did he hear the Lord, nor did he follow Him; but afterwards, as I said, [followed] Peter, who adapted his instructions to the needs [of his hearers], but had no design of giving a connected account of the oracles of the Lord.' 'So then,' adds Papias, 'Mark made no mistake, while he thus wrote down some things as he remembered them; for he made it his one care not to omit anything he had heard, or to set down any false statement therein.' It is here clearly implied that Mark had only his memory to rely on at the time of his writing, Peter being no longer within reach. Clement of Alexandria (quoted by Eusebius) is the first who knows that Mark wrote before Peter's death, but also informs us that he wrote without Peter's knowledge. Eusebius in another place, probably by a lapse of memory, seems to make Clement say that Peter afterwards gave the work his sanction. Origen states that Mark wrote, 'Peter showing him the way,' but the phrase does not necessarily imply dictation.

Modern critics readily recognise a certain basis of truth in the ecclesiastical tradition as to Peter's connection with Mark's gospel. Clearly all that makes for its first-hand character makes also for its Petrine origin. Much of what it contains, both in substance and in manner, betokens the eye-witness, and such an eye-witness as Peter, or at least one of the three most intimate disciples. The earlier part of the narrative centres mainly round Capernaum and Peter's house there. Among the most important turning-points in it are Peter's call and Peter's confession. But the gospel is not all equally primary. A large portion of what seems in it to be secondary might indeed be explained in some degree were it permissible to hold that Peter's own recollections had been modified in the course of thirty years' brooding reflection on the real significance of the great personality he had followed during those brief months of earthly discipleship, and (as he would in later years feel) had at first so imperfectly understood. The history when looked back upon might well assume to him a different aspect in memory and imagination from that which it had worn while he was actually passing through the scenes with mind and heart only half-opened to

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its ideal and figurative elements and its deepest religious meanings. That such was the case with his early companion John at least is a theory that has found considerable acceptance with Christian apologists (see JOHN, GOSPEL ACCORDING TO). But even so, there are passages in Mark in which the narrative is so brief and vague as to make it difficult to believe that they rest on the authority of an eye-witness only once removed. This is confessedly the case with Mark, xvi. 9–20, and partly also with the history of the closing days in Jerusalem, though even this abounds with many picturesque touches, such as that in xi. 4. Instances are frequent in which the exegete feels constrained to suppose some dislocation or derangement of a context, or misunderstanding, perhaps mistranslation, of a saying. See, in particular, chap. xiii.

The general conclusion of the critical discussion is that in the second gospel on the whole we hear the language of a reporter who had often listened to one who claimed to have been present at the scenes he described. The weight of traditional as well as of internal evidence goes to show that it was produced in Rome about 70 A.D., perhaps rather after than before that date. Apart from what he had heard in Petrine circles, the author doubtless felt himself at liberty to make use of whatever he may have gleaned elsewhere from what he deemed trustworthy sources for the Galilean and Jerusalem tradition. It is even a question whether he may not actually have seen or heard read, in whole or in part, the 'logia' of Matthew. That the second gospel was used by the authors both of the first and of the third may be regarded as now made out. On the assumption that the 'logia' of Matthew contained absolutely no narrative material, it used to be argued that the second gospel must originally have been somewhat fuller than it now is ('original' Mark, 'Ur-Marcus'). But this theory is now very generally given up. A more likely supposition is that the original form was shorter than the present. Mark, xvi. 9–20, is confessedly late. It is not improbable that the preface, i. 1–3, was at one time absent. Some have thought that vii. 24–viii. 26 did not occur in the copy of Mark used by Luke. Reuss has long held that the original Mark consisted only of i. 21–vi. 48 and viii. 27–xiii. 37. It is not unlikely that editorial insertions and alterations have been made throughout. Critical investigation into the genesis of the synoptical gospels, though far advanced, cannot be said to have reached completion, and there is good reason to hope that scholarship may yet succeed in reaching still more definite results.

See the works enumerated under GOSPELS, especially the introductions of Holtzmann and Weiss, and also the commentaries by these authors (Weiss, 7th ed. of Meyer, 1885; Holtzmann, 1889). Compare also P. Ewald, *Das Hauptproblem der Evangelienfrage* (1890). The English text of Mark is printed, and its relations to Matthew and Luke graphically exhibited, in Abbott and Rushbrooke's *Common Tradition of the Synoptic Gospels* (1884). A suggestive reconstruction of the supposed first redaction of Mark is given in Solger's *Urevangelium* (1890).

Mark Antony. See ANTONIUS.

Market-Drayton, or DRAYTON-IN-HALES, a town of Shropshire, on the Tern, 18 miles NE. of Shrewsbury. It has a grammar-school (1554) and a church dating from the 12th century, up whose spire Clive (q.v.) clambered as a boy. At Blore-heath, 3 miles to the east, the Yorkists won a victory in 1459. Pop. of parish, 5188. See two works by J. R. Lee (1861) and T. P. Marshall (1884).

Market-Harborough, a market-town of Leicestershire, on the river Welland and the Union Canal, 16 miles SE. of Leicester, 18 N. of Northampton, and 84 NNW. of London. It has traces of a Roman camp; a fine Perpendicular church, built by John of Gaunt as an atonement for his intrigue with Catharine Swynford, with a broach spire 154 feet high; a corn exchange (1858); and a grammar-school (1614; restored 1869). Charles I. slept here before Naseby. Situated in a rich grazing country, it is a famous hunting-centre, and gives title to one of Whyte-Melville's novels. Pop. (1851) 2325; (1881) 5351. See works by John H. Hill (Leicester, 1875) and J. E. Stocks (Lond. 1890).

Markets. See FAIRS.

Markham, CLEMENTS ROBERT, C.B., F.R.S., F.S.A., geographer and author, son of the Rev. D. Markham, canon of Windsor. He was born 1830 at Stillingfleet, near York, educated at Westminster, from which school he entered the navy in 1844. Immediately on passing as lieutenant in 1851 he left the navy, and in 1855 became a clerk in the Board of Control. In 1863 he was elected secretary to the Royal Geographical Society, and in 1867 became assistant-secretary in the India Office. In 1868 he was placed in charge of the geographical department in that office. He served in the Arctic expedition (1850–51) in search of Sir John Franklin. He explored (1852–54) Peru and the forests of the Eastern Andes; he introduced (1860) the cultivation of the cinchona plant from South America into India; served as geographer (1867–68) in the Abyssinian expedition, and was present at the storming of Magdala. Of his numerous publications, which include many translations from the Spanish, and several antiquarian and genealogical works, mention can only here be made of his *Grammar* and *Dictionary of the Ynca Language* (1863–64): *The Threshold of the Unknown Region* (1874; 4 eds.); *The War between Chili and Peru* (1879; 3 eds.); *Missions to Thibet* (1877; 2 eds.); his *Reports on the Moral and National Progress of India for 1871–73*; and his *Life of John Davis*, in the 'Explorers' series (1889). He edited the *Geographical Magazine* from 1872 to 1878.

Marking Ink. See INK.

Markirch (Fr. *Ste-Marie-aux-Mines*), a town of Upper Alsace, on the Leber, 40 miles SW. of Strasburg by rail, with important cotton and woollen mills. Pop. 11,421.

Marl, a mixture, naturally existing, of clay and carbonate of lime. Marls are found in very different geological formations, but everywhere seem to owe their origin to deposition by water. The name is sometimes applied to friable clays, or mixtures of clay and sand, in which there is almost no trace of lime; but the presence of a notable proportion of carbonate of lime is essential to marls, properly so called. This proportion varies from 6 to 20 per cent. Marly soils are in general of great natural fertility. Marl is very advantageously used as a manure, acting both chemically and mechanically; but different kinds of marl are of very different value in this respect. The use of marl as a manure has been practised from ancient times. An English statute of 1225 (10 Henry III.) gave every man a right to sink a marl-pit on his own ground, and there is other evidence that the application of marl to land was common in England in the 13th century. The quicker action and greater efficiency of lime have led to its use in many cases instead of marl, although some kinds of marl are extremely useful in some soils. The bulkiness of marl confines its use to the neighbourhood in which it is found. Marl is sometimes indurated into a rock; a slaty variety, containing much bitumen, is found in Germany. See also LIAS.

Marlborough, an old and interesting market-town of Wiltshire, pleasantly situated in the valley

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of the Kennet, near Savernake Forest, 75 miles W. of London and 11 SSE. of Swindon. Its broad High Street contains some picturesque houses, and at the east end is St Mary's Church with the town-hall (1790); at the west St Peter's with the college. Near the latter is a British mound, on which early in the 12th century Bishop Roger of Salisbury built a castle. This afterwards became a royal residence; and here in 1267 Henry III. held the parliament which enacted the 'Statutes of Marleberge' for restoring good government after the Barons' wars. An ancient municipal borough, Marlborough, till 1867, returned two members to parliament, and till 1885 one. Pop. (1851) 3460; (1881) 3343.—Marlborough College was incorporated in 1845, and obtained an additional charter in 1853; the number of pupils is between 500 and 600, of whom about 70, sons of clergymen, are on the foundation. There are some thirty scholarships worth from £15 to £80 annually, and fourteen leaving exhibitions for Oxford, Cambridge, and Woolwich. The nucleus of the college buildings was formerly a famous coaching-house; and their special glory is the new chapel, an Early Decorated nave with apsidal chancel, completed in 1886, at a cost of £30,000. See local histories by Waylen (1854) and Hulme (1881).

Marlborough, a provincial district of New Zealand, in the north-east corner of the South Island, 130 miles long by 30 broad; area, 3,000,000 acres, of which 200,000 are agricultural land and 1,300,000 suitable for pastoral occupation. Amongst the minerals are gold, antimony, copper, and coal. See NEW ZEALAND.

Marlborough, JOHN CHURCHILL, DUKE OF, the ablest general and diplomatist of his time, was born on the 24th June 1650, at Ashe, in Devonshire, an old manor-house, which can still be seen between Axminster and Seaton. His father, Sir Winston Churchill, had been an enthusiastic adherent of the Stuarts, and on the accession of Cromwell to power his estates had been consequently sequestrated. At the Restoration, however, Winston recovered possession of his lands, but his poverty prevented him from giving his children an education befitting their position, so that young Churchill and his brother George had to face the world with little Latin and less Greek, and a knowledge of English history gathered from the plays of Shakespeare. During his engagement as a page to the Duke of York, John was fortunate enough to secure a commission as ensign in the Guards, and at the age of sixteen, in the year 1667, he was sent to Tangiers, then besieged by the Moors. It is said that he was sent to Tangiers on account of the king's jealousy of his favour with the Duchess of Cleveland; and the story is told that on one occasion, being nearly surprised by the king, he leapt out of a window and was presented by the duchess with £5000, £4500 of which he invested in an annuity of £500 a year. The papers with regard to the annuity transaction are still in existence. At Tangiers Churchill had little opportunity of distinguishing himself. Recalled to England by the Duke of York, he was promoted to a captaincy, and in command of a grenadier company he was despatched to join Turenne, to assist Louis XIV. in the reduction of the fortresses on the Dutch frontier. Here his brilliant courage and ability at once gained him a colonelcy, although his promotion would not have been so rapid had he not called into requisition the influence of his sister, Arabella, mistress of the Duke of York. His prosperity was further advanced by his marriage with Sarah Jennings, a lady as remarkable for her talents and imperious disposition as for her beauty. In 1682 he was created Baron Churchill of Eyemouth, in Scotland. On the accession of the Duke of York to the throne as James II., the services of Colonel Churchill to his master were not forgotten, as he was raised to the English peerage under the title of Baron Churchill of Sandridge, in Hertfordshire. Promoted to be general, Churchill took an active part in quelling the rebellion of Monmouth; but, on the landing of the Prince of Orange, he stole away to the side of the invader, leaving a letter in which he endeavoured to explain away his treachery by saying that only the inviolable dictates of his conscience and a necessary concern for his religion could have induced him to desert his master. James's daughter, the Princess Anne, accompanied by Lady Churchill, also fled to join the rebels in the north. William, on his accession, showed his gratitude for the assistance given him by Churchill by creating him Earl of Marlborough. Notwithstanding the conspicuous service rendered by Marlborough in reducing Ireland to subjection, and as commander of the troops employed against the French in the Netherlands, in 1689–91, William III. could not rid himself of a certain not altogether ungrounded suspicion of his new earl, till in 1692 he fell into disfavour, and was dismissed from all his offices. As the result of the discovery of a plot with which a clever forger named Young associated the name of Marlborough, the earl was arrested and lodged in the Tower. In ten days he was released, however, but for five years he was without any public employment, till the death of Mary, when he was restored to the favour of the king, and he retained it till the death of William in 1702.

At the accession of Queen Anne he was entrusted with the command of the British army in the Netherlands on the declaration of the war of the Spanish succession, in which he was to show his unrivalled strategical genius during one of the greatest series of military operations in which England has ever been engaged. Anne showered honours on the head of the fortunate earl and his wife, her closest friend. Marlborough was made a knight of the Garter, Commander-in-chief, and Master General of the Ordnance, while his lady was appointed Groom of the Stole, Mistress of the Robes, and Keeper of the Privy Purse. Marlborough, in fact, became regent in all but name. His wife governed the queen, and he himself directed Godolphin, the Lord High Treasurer, whose son had married his daughter. At the opening of the campaign, Marlborough, on his arrival at The Hague, was named commander-in-chief of the combined English and Dutch forces, with a salary of £10,000. The campaign was one long series of triumphs for the allies. In 1702, for driving the French out of Spanish Guelders, the reward was a dukedom and £5000 per annum 'from the post-office.' The year 1703 was made memorable to the duke by the death of his only surviving son, the Marquis of Blandford, who succumbed to an attack of smallpox. Marlborough had little time to grieve over his loss, as he was summoned at once to the campaign in the Low Countries, in which he was so much disgusted with the Dutch that he returned to England, seriously thinking of throwing up his command. Next year, however, we see him supporting the Emperor of Germany, and joining Prince Eugene of Savoy, in July of that year storming successfully the French and Bavarian lines at Donauwörth, and on the 13th August gaining a glorious but bloody victory over the enemy at Blenheim. Of 56,000 men, the French and Bavarians lost 40,000, and the victors' killed and wounded numbered fully 12,000. The result of this decisive battle stamped Marlborough as the first general in Europe. Parliament bestowed upon him the estate of Woodstock, the queen caused Blenheim Park (q.v.) to be built for him, and the emperor

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created him a prince of the Holy Roman Empire. Diplomatic negotiations occupied the principal part of Marlborough's time and attention in 1705, but in 1706 he resumed that career of victory which broke the force of the spell surrounding the great power of France under Louis XIV., who gloried in calling himself the 'Invincible.' On the 23d May 1706 the battle of Ramillies was fought, when the French were obliged to desert the line of the Scheldt and evacuate the whole of Spanish Flanders. The campaign of 1707 was an almost wholly inactive one; but in 1708 the attempt by the French under Vendôme to recover Flanders led to the battle of Oudenarde—the only battle of Marlborough's engaged in front of a fortified town—fought on July 11, and resulting in the total defeat of the French forces. Marlborough then laid siege to Lille and Ghent, and the surrender of these two towns ended the long and arduous campaign. The year 1709 was distinguished by the battle of Malplaquet—in Marlborough's words, 'a very murdering battle.' The numbers were practically equal, but the French had an infinite superiority of position. There are few battles in history of which it can so certainly be said that the best men won. The carnage was tremendous—20,000 on the side of the allies and 8000 on that of the French. The blood of Malplaquet—the last of the four engagements which gave Marlborough's name a unique position in the roll of generals—did not bring about peace; and in 1711 he was afield again, taking town after town from the French. This eventually led to the treaty of Utrecht, which gave thirty years of peace to Europe.

Meanwhile important events were taking place in Britain. The queen, tired of the tyranny exercised by the Duchess of Marlborough, shook off the yoke, dismissed her ministers, Godolphin and Sunderland, paving the way for the elevation to power of the Earl of Oxford and the Tories. Thereupon a charge was preferred against Marlborough of having embezzled public money, and he was deprived of his offices, till the accession of George I., when, in a day, he was restored to the position in which he stood after the battle of Blenheim. A stroke of apoplexy on 28th May 1716, although it impaired his speech, did not preclude his attendance in parliament till within six months of his death, which occurred on 16th June 1722. His funeral obsequies in Westminster Abbey were celebrated with great magnificence, and all ranks and all parties in the state joined in doing him honour. Charges of avarice and peculation have been brought against Marlborough—among others, by Hallam, Mahon, Macaulay, and Thackeray. Despite this, and the certainty that he thought more of his own interest than the cause in which he was engaged, his character had many elements of excellence. He was generous in action, gentle in temper, a devoted husband, and a man of religious fervour.

His wife, SARAH JENNINGS, was born on 29th May 1660, and when about twelve years of age entered the service of the Duchess of York, and became the chosen and most intimate friend of her stepdaughter the Princess Anne. Like Marlborough himself, Sarah came of an ancient but ruined royalist family. On the accession of Anne to the throne, the duchess exercised over the young queen the influence due to a superior and singularly active mind. Her power was almost boundless; the Whig ministry relied upon her support, and she disposed of places and offices at her pleasure, and is said to have accumulated money by the transactions. Her fair fame, however, apart from this, was never, even in those days of scurrilous lampoon, tarnished by the breath of scandal. Her rule, which lasted for a considerable time, at last became unbearable, and she was supplanted in the favour of the queen by her own cousin, Mrs Masham, whom she herself had introduced to court. She retired from the queen's service in January 1711; and for nearly a quarter of a century she survived her husband, living in complete retirement. She was of a very pugnacious disposition, only happy when quarrelling with her friends or engaged in lawsuits, such as those arising out of the completion of Blenheim. She died on 29th October 1744, leaving a fortune of three millions sterling, of which she bequeathed £10,000 to William Pitt. As the Marquis of Blandford, the only son of the Duke and Duchess of Marlborough, died young, the title was inherited by the descendants of one of their daughters, the Countess of Sunderland.

See the *Memoirs* by Coxe (1819), the short Life by Saintsbury (1885), and the article by Leslie Stephen in *Dict. Nat. Biog.* (vol. x. 1887).

Marlinespike, an iron pin, with a large head and taper point, used on shipboard for separating the strands of rope preparatory to splicing or marling; also employed as a lever in tightening rigging, &c. See KNOTS AND SPLICES.

Marlitt, EUGENIE, the pseudonym of E. JOHN, a German novelist, born at Arnstadt in Thuringia, on 5th December 1825. Her beautiful voice and musical talent gained her the favour of the Princess of Schwarzburg-Sondershausen, who sent her to Vienna, where, after three years of study, she appeared on the stage. But a successfully-begun career was cut short by an affection of the ear, and Fräulein John acted as reader to her patroness till 1863. Retiring in that year into private life, she spent her time in writing romances, interesting enough, but with strong didactic tendencies and somewhat unreal. Of these the most successful was *Goldelse* (1866; 18th ed. 1885); others, such as *The Old Maid's Secret* (1867), *Princess of the Moor* (1871), *Second Wife* (1873), *Countess Gisela* (1869), and *Thuringian Stories* (1869)—all except the last translated into English, 1870 to 1873—have also passed through many editions. She died at Arnstadt on 22d June 1887. A collected edition of her *Romanzen und Novellen* was issued in 5 vols. in 1889.

Marlow, GREAT, a town of Buckinghamshire, on the Thames, 29 miles W. of London by rail, has manufactures of lace and paper, an iron suspension bridge, a house where Shelley lived in 1817, and a grammar-school (formerly a blue-coat school). It sent two members to parliament down to 1867, and one till 1885. Pop. (1881) 4763.

Marlowe, CHRISTOPHER, Shakespeare's greatest predecessor in the English drama, a shoemaker's son, was baptised at Canterbury, 26th February 1563–64. From the King's School, Canterbury, he was sent to Benet College (now Corpus Christi), Cambridge; proceeded B.A., 1583, and commenced M.A., 1587. How he employed himself after taking his bachelor's degree is not known. A ballad printed from MS. by J. P. Collier asserts that he was an actor at the Curtain Theatre, and 'brake his leg in one lewd scene when in his early age;' but the ballad is evidently spurious. Colonel Cunningham suggests that he may have served as a soldier in the Low Countries.

The earliest of Marlowe's extant plays is *Tamburlaine the Great*, in two parts, first printed in 1590, and probably produced in 1587. In spite of its bombast and violence it is infinitely superior to any tragedy that had yet appeared on the English stage. By his energy and fervour, his aspiring imagination and majestic utterance, he confounded his rivals and won immediate supremacy. Very

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noticeable is the proud self-confidence displayed by the young poet in the prologue:

> From jigging veins of rhyming mother-wits,
> And such conceits as clownage keeps in pay,
> We 'll lead you to the stately tent of war,
> Where you shall hear the Scythian Tamburlaine
> Threatening the world with high astounding terms.

Earlier dramatists had employed blank verse, but it had been stiff and ungainly: Marlowe was the first to discover its strength and variety. The popularity of *Tamburlaine* was extraordinary. A ludicrous line in the Scythian conqueror's address to the captive monarchs whom he has harnessed to his chariot—'Holla, ye pampered jades of Asia!'—was constantly parodied for half a century. Doubtless the extravaganza of the play contributed to its success. The part of Tamburlaine was originally taken by the famous actor, Edward Alleyn, who afterwards personated Faustus and Barabas.

The Tragical History of Dr Faustus was probably produced soon after *Tamburlaine*. The earliest edition is dated 1604; in the edition of 1616 additional comic matter is inserted by an inferior hand, but it also appears to preserve some genuine passages that were dropped from the earlier edition. *Faustus*, as it has come down, is rather a series of detached scenes than a finished drama; and some of these scenes are evidently not by Marlowe. One playwright after another was employed to furnish 'additions.' But the nobler scenes are marvellously impressive; nowhere is Marlowe's genius shown more vividly than in Faustus's glorious description of Helen's beauty and in the terrible soliloquies that prepare us for the catastrophe. *Faustus* held the stage, and was revived at the Restoration. Edward Phillips, Milton's nephew, quaintly remarks that 'Of all that Marlowe hath written to the stage his *Dr Faustus* hath made the greatest noise, with his devils and such like tragical sport.' A German version was acted by English players at Gratz during the carnival in 1608, and at Dresden in 1626. Goethe expressed his admiration for Marlowe's work.

The Jew of Malta, produced after December 1588, was first published in 1633, with a prologue by Thomas Heywood. It is a very unequal play. The first two acts are conducted with masterly skill and vigour; but the last three are absurdly extravagant, degenerating into vulgar caricature. If Marlowe's hand had not faltered, if the later part had been equal to the earlier, Barabas would have been worthy to stand alongside of Shylock.

Edward II., produced about 1590, is the maturest of Marlowe's plays. It has not the magnificent poetry that we find in *Faustus* and in the first two acts of *The Jew of Malta*, but it is planned and executed with more firmness and solidity—in a more temperate and patient spirit. The various characters are skilfully discriminated, and the action is never allowed to flag. Many critics have preferred it to Shakespeare's *Richard II.*; it is certainly no whit inferior. Charles Lamb declared that 'the reluctant pangs of abdicating royalty in Edward furnished hints which Shakespeare scarce improved in his *Richard II.*; and the death-scene of Marlowe's king moves pity and terror beyond any scene, ancient or modern, with which I am acquainted.'

The Massacre at Paris is the weakest of Marlowe's plays, and has descended in a mutilated state. It was written after the assassination of Henry III. of France (2d August 1589), and was probably one of the latest plays. An early MS., a fragment of an original playhouse transcript, preserves part of scene xix.; and a comparison of the MS. text with the text of the printed copy shows that the play was mangled in passing through the press.

The Tragedy of Dido is stated on the title-page of the first edition (1594) to have been written by 'Christopher Marlow and Thomas Nash, Gent.' Probably it was left in a fragmentary state by Marlowe and was finished by Nash. It is of slight value; but contains some fanciful poetry (and extraordinary bombast). There can be little doubt that Marlowe had a hand in the three parts of *Henry VI.*; and it is probable that he was concerned in the authorship of *Titus Andronicus*. A wild, shapeless tragedy, *Lust's Dominion*, was published in 1657 as the work of Marlowe. It deals with historical events that happened after Marlowe's death, but may nevertheless have been adapted from one of Marlowe's lost plays.

The unfinished poem, *Hero and Leander*, composed in heroic couplets of consummate beauty, was first published in 1598; a second edition, with Chapman's continuation, followed in the same year. Ben Jonson is reported to have said that Marlowe's verses were examples fitter for admiration than for parallel. From a passage in the Third Sestiad it appears that Marlowe had enjoined upon Chapman the task of finishing the poem; but neither Chapman nor any other poet could have taken up the story with any hope of success. *Hero and Leander* passed through numerous editions, and won universal applause. Shakespeare quoted in *As You Like It* the line, 'Who ever loved that loved not at first sight?' and feelingly apostrophised the poet as 'Dead Shepherd.' Nash, in *Lenten Stuffe*, speaks of 'divine Musæus, and a diviner poet than him, Kit Marlowe.' The watermen sang couplets from it as they plied their sculls on the Thames. Henry Petowe, a poor versifier but enthusiastic admirer of Marlowe, tells how

> Men would shun their sleep in still dark night
> To meditate upon his golden lines.

Marlowe's translations of Ovid's *Amores* and of the first book of Lucan's *Pharsalia* add nothing to his fame. The pastoral ditty 'Come, live with me and be my love,' to which Sir Walter Raleigh wrote an Answer, was imitated, but not equalled, by Herrick, Donne, and others. Izaak Walton pronounced it to be 'choicely good.' It was first printed in *The Passionate Pilgrim* (1599), without the fourth and sixth stanzas. In *England's Helicon* (1600) it appeared complete, with the author's name, 'C. Marlowe,' subscribed. Another anthology, Allot's *England's Parnassus* (1600), preserves a fragment by Marlowe, beginning 'I walked along a stream for pureness rare.'

In May 1593, at the age of twenty-nine, Marlowe met a violent death in a quarrel (about a courtesan, it is stated) with one Francis Archer, a serving-man. The burial-register of the parish church of St Nicholas, Deptford, has the entry: 'Christopher Marlow, slain by ffrancis Archer [the name is not quite clear in the register], the 1 of June 1593.' Highly-coloured accounts of his death were given by Puritanical writers. Thomas Beard, in the *Theatre of God's Judgement*, declares that 'hee even cursed and blasphemed to his last gaspe, and together with his breath an oath flew out of his mouth.' There can be no doubt that Marlowe had led an irregular life. In Harleian MS. 6853 is a note 'contayninge the opinion of one Cristofer Marlye concernyng his damnable opinions and judgment of Relygion and scorne of Gods worde,' drawn up (shortly before Marlowe's death) by a certain Richard Baine, who was hanged at Tyburn, 6th December 1594. This scandalous document, which in parts is quite unfit for publication, was printed in full by Ritson. There is evidence that Sir Walter Raleigh and Thomas Kyd the dramatist were accused of sharing Marlowe's views.

Had his life been lengthened, Marlowe would doubtless have written more perfect tragedies, but

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he could hardly have left a better poem than *Hero and Leander*. Comedy he would never have attempted; he had no humour. In tragedy he prepared the way for Shakespeare, on whose early work his influence is firmly stamped.

Dyce's scholarly edition of Marlowe's works has not been superseded. It was issued in 1850, 3 vols., by Pickering; revised edition, 1 vol. 1858. Cunningham's edition (1 vol.) is useful but inaccurate. In 1885 the present writer brought out an edition (3 vols.). Marlowe's best plays are included in the 'Mermaid' series, ably edited by Mr Havelock Ellis. *Dr Faustus* has been elaborately edited by Professor A. W. Ward. In Germany Messrs Hermann, Breymann, and Albrecht Wagner are engaged in reproducing the old texts, with the original orthography and exhaustive lists of *variæ lectiones*. In 1888 it was resolved to erect a monument to Marlowe's memory on the Dane John, Canterbury. No authentic portrait is extant.

Marmalade (Port. *marmelada*, from *marmelo*, 'a quince;' which, again, is from Mid. Lat. *malomellum*, Gr. *melimēlon*, 'honey-apple' or 'sweet apple') is a semi-liquid preserve, made by boiling the pulp of thick-rinded fruits, such as oranges, pine-apples, quinces, &c., with portions of the rind. The most common kind of marmalade is made from the bitter or Seville oranges, the common or sweet sorts being considered inferior for this purpose, though also occasionally used. The woolly coating on the interior being removed, the rind is cut up into thin strips, and boiled along with the expressed juice of the pulp and a quantity of sugar equal in weight to the other ingredients. The preserve is now made on a commercial scale in factories at London, Dundee, Paisley, and elsewhere.

Marmion, SHACKERLEY, minor dramatist, was born in Northamptonshire, January 1602, studied at Wadham College, Oxford, and took the degree of M.A. in 1624. He squandered his fortune, fought in the Low Countries, and joined Sir John Suckling's troop for the expedition against the Scots, but fell sick at York and returned to London, where he died early in 1639. He left behind an epic, *Cupid and Psyche* (reprinted by Singer 1820), and three comedies, *Holland's Leaguer*, *A Fine Companion*, and *The Antiquary*. The last form a volume (1875) in Maidment and Logan's *Dramatists of the Restoration*. The ancient family of the Marmions of Scrivelsby were the former hereditary champions at English coronations. They came in with the Conqueror and settled at Tamworth, but became extinct with the fifth baron under Edward I. Scott says of the hero of his poem, 'I have not created a new family, but only revived the titles of an old one in an imaginary personage.'

Marmont, AUGUSTE FRÉDÉRIC LOUIS VIESSE DE, Duke of Ragusa and Marshal of France, was born 20th July 1774 at Châtillon-sur-Seine, entered the army at an early age, and made the acquaintance of Napoleon at Toulon. He accompanied him to Italy, where his courage at Lodi, Castiglione, and San Giorgio, earned him the rank of general of brigade in the campaign of Egypt. He returned with Bonaparte to France, supported him in the revolution of the 18th Brumaire, and commanded his artillery at Marengo, after which he became general of division. He was sent to Dalmatia in 1805 to defend the Ragusan territory against the Russians, defeated them at Castelnuovo, and was made Duke of Ragusa. Hence he was summoned to join the great army in 1809, the day before the battle of Wagram, was entrusted with the pursuit of the enemy, won the battle of Znaim, and earned a marshal's baton. He was thereafter for eighteen months governor of the Illyrian provinces; and in 1811 succeeded Massena in the chief command in Portugal, where he showed skilful strategy in the presence of Wellington. A severe wound, received at the defeat of Salamanca, compelled him to retire to France. In 1813 he commanded a *corps d'armée*, fought at Lützen, Bautzen, and Dresden, and maintained the contest with great spirit in France in the beginning of 1814, till further resistance was hopeless, when he concluded a truce with Barclay de Tolly, which compelled Napoleon to abdicate, and earned himself from the Bonapartists the title of the traitor. The Bourbons loaded Marmont with honours. On the return of Napoleon from Elba he was obliged to flee. After the second restoration he lived in retirement till the revolution of 1830, when, at the head of a body of troops, he endeavoured to reduce Paris to submission, and finally retreating with 6000 Swiss, and a few battalions that had continued faithful to Charles X., conducted him across the frontier. From that time he travelled much and resided chiefly in Vienna and Venice, where he died, 2d March 1852. He was the last survivor of the marshals of the first French Empire. His chief work is his *Esprit des Institutions Militaires* (1845). His *Mémoires* fill nine volumes (1856–57). See Sainte-Beuve, *Causeries du Lundi*, vol. vi.

Marmontel, JEAN FRANÇOIS, a famous but hardly a great French writer, was born of an obscure family at Bort, in the Limousin, 11th July 1723. He made his studies in a Jesuit college, and found employment in a seminary at Toulouse, but early turned to literature, and went to Paris in 1745 by advice of Voltaire. Here he wrote successful tragedies and operas, and was fortunate enough in 1753 to get a secretaryship at Versailles through the influence of Madame Pompadour. Soon after he received a more lucrative appointment, the official journal, *Le Mercure*, being entrusted to his charge. In its columns he commenced the publication of his finished and oft-translated *Contes Moraux* (1761). Marmontel was elected to the Academy in 1763, and became its secretary in 1783, as well as Historiographer of France. After the Revolution he retired to the village of Abbeville, near Evreux, where he died, 31st December 1799. His most celebrated work was the well-known *Bélisaire*, a dull and wordy political romance, containing a chapter on toleration which excited the most furious hostility on the part of the theologians of the Sorbonne, to which Marmontel replied in *Les Incas* by ascribing the cruelties in Spanish America to religious fanaticism. In 1787 appeared his interesting and valuable, but completely uncritical, *Éléments de Littérature*, consisting of his contributions to the *Encyclopédie*. His *Mémoires* is an interesting survey of his whole life, brightened by glimpses of all the great figures he had seen cross the stage from Massillon to Mirabeau.

His own edition of his complete works fills 17 volumes (1786–87), to which must be added 14 volumes published posthumously. Good editions are those of Villeneuve (1819–20) and Saint-Surin (1824–27). See Sainte-Beuve's *Causeries du Lundi*, vol. iv.

Marmora, LA. See LA MARMORA.

Mar'mora, SEA OF, the *Propontis* of the ancients, separating European from Asiatic Turkey, and connecting the Ægean Sea by the Dardanelles (anc. *Hellespont*) with the Black Sea by the Strait of Constantinople (anc. *Bosporus*). It is of an oval form, is 175 miles in length by 50 in breadth, has an area of 4499 sq. m., and a maximum depth of 4250 feet. The Gulf of Ismid extends about 30 miles eastwards into Asia. The sea contains several islands, the largest of which is Marmora or Marmara (area, 50 sq. m.), famous for its quarries of marble and alabaster.

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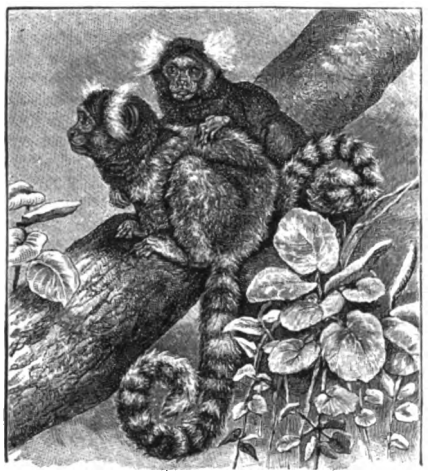
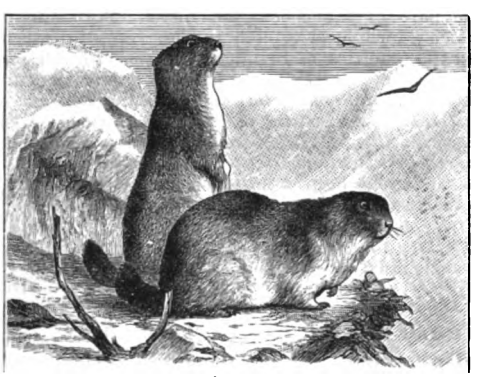
Marmoset, a name given to a group of American monkeys which are always of small size, and which differ in various particulars from other American monkeys (see MONKEY). The popular name of Ouistiti has been given to these monkeys on account of the sharp whistling sound which they make when frightened or irritated.



Marmoset (*Hapale jacchus*).

There are a good many species of marmosets which are placed in two genera, Midas and Hapale, both confined to Central and South America. These creatures are easily kept in captivity, and are usually of an affectionate disposition.

Marmot (*Arctomys*), a genus of rodents, belonging to the family Sciuridæ, resemble squirrels in their dentition, although in form and habits they more closely resemble rats and mice. They have two incisors and two premolars in each jaw, four molars on each side above, and three below.—The Common Marmot, or Alpine Marmot (*A. marmotta*), is a native of the Alps, the Pyrenees, and the more northern mountains of Europe, up to the limits of perpetual snow, and is found also in Asia. It is about the size of a rabbit, grayish yellow, brown



The Alpine Marmot (*Arctomys marmotta*).

towards the head; feeds on roots, leaves, insects, &c.; and is gregarious, often living in large societies. Marmots spend the winter in their burrows, in one chamber of which is a store of dried grass; but the greater part of the winter is passed in a torpid condition. The Alpine Marmot is easily tamed. There are three kinds of marmots in North America, all popularly termed 'Woodchucks.' The 'Prairie Marmot' (see PRAIRIE DOG) is nearly allied, but does not belong to the same genus.

Marne, a river of France, the most considerable tributary of the Seine, rises in the plateau of Langres, flows north-west past Châlons to Épernay, and thence west, joining the Seine at Charenton, a few miles above Paris. Its length is 326 miles, and it is navigable for 126 miles up to St Dizier. Its stream is rather rapid, and in most places has a wide bed. It is connected by canals with the Rhine, the Aisne, and the Seine.

Marne, a department in the north-east of France, formed out of the old province of Champagne, is traversed by the river Marne, and to a less extent by the Seine and the Aisne. Area, 3159 sq. m.; pop. (1886) 429,494. It is in the dry and chalky soil of the north that the best varieties of Champagne Wine (q.v.) are grown, of which two-fifths are exported. The rearing of sheep is an important industry, and extensive woollen manufactures are carried on. Cereals, beetroot, and potatoes are grown; honey and wax are produced; building stone is quarried; and metal works, tanneries, &c., are in operation. Marne is divided into the five arrondissements of Châlons-sur-Marne (the capital), Épernay, Rheims, Sainte-Ménéhould, and Vitry-le-François.

Marne, HAUTE, a department in the north-east of France, formed chiefly out of the old province of Champagne, and embracing the land in the upper basins of the Marne and the Meuse. It rises in the south into the plateau of Langres and the Monts Faucilles (1500 to 1600 feet). Area, 2402 sq. m.; pop. (1886) 247,781, a decrease of 7095 since 1881. Cereals, wine (12 million gallons annually), fruits, and potatoes are the principal products. The department yields 200,000 tons of iron ore annually, and there are numerous furnaces. The cutlery is in high repute. There are three arrondissements of Chaumont, Langres, and Vassy; capital, Chaumont.

Marnix, PHILIP VAN, Lord of St Aldegonde, Dutch writer and patriot, was born at Brussels in 1538. A pupil of Calvin and Beza at Geneva, on his return home he took an active part in promoting the Reformation, and in 1566 a no less active part in the revolt of the Netherlands against Spain. An intimate friend of William of Orange, he was appointed by this great man to be his representative at the first meeting of the Estates of the United Provinces, held at Dort in 1572, and on subsequent occasions was sent on special missions to the courts of France and England. After helping to cement the Union of Utrecht and visiting the diet at Worms, he was nominated in 1583 burgomaster of Antwerp. This city he defended thirteen months against the Spaniards; but, having then capitulated, he incurred so much ill-will that he retired from public life. The leisure of his retirement he utilised for literary work, besides taking an active interest in the newly-founded university of Leyden. From his pen came the *Wilhelmus* song, the hymn of Dutch liberty and Protestantism; the epoch-making prose satire on the Roman Catholic Church, entitled *The Roman Bee-hive* (1569); a metrical translation of the Psalms from the Hebrew (1580); and the beginning of a prose translation of the Bible. Marnix died at Leyden, 15th December 1598. His works were edited in 7 vols. (Brussels, 1855-59); his religious works in 2 vols. (1871-73). See Lives in Dutch by Broes (1840) and Frédéricq (1882), and the French monograph by Juste (1858).

Marocco. See MOROCCO.

Marochetti, CARLO, BARON, an Italian sculptor of respectable talent, was born at Turin in 1805, and trained in Bosio's studio. Settling

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at Paris in 1827, he produced 'Young Girl sporting with a Dog,' 'Fallen Angel,' relief on the Arc d'Étoile, an altarpiece for the Madeleine, a memorial work for Bellini's tomb, a statue of Latour d'Auvergne, &c. On the outbreak of the revolution in 1848 he repaired to London. In Britain his best works were statues of Queen Victoria for Glasgow, of Richard Cœur-de-Lion, and of Lord Clyde in Waterloo Place, London. Mounted figures of Emmanuel Philibert and Charles Albert of Savoy were chiselled by him for North Italy. He died at Paris on 4th January 1868.

Maronites, a Christian sect of Syria, generally regarded as the descendants of a remnant of the Monothelite sect (see MONOTHELISM), who settled on the slopes of Lebanon in the 7th century. They take their name from a monk Maro, who lived in the 5th century, or more probably from their first patriarch Moro (701). These people maintained their independence against the followers of Islam; but in the 12th century, on the establishment of the Latin kingdom of Jerusalem, they abandoned their distinctive monothelite opinions, and recognised the authority of the Roman Church. In 1445 they entered into a formal act of union with the Roman Church; in 1584 a college was founded in Rome by Pope Gregory XIII. for the education of the Maronite clergy; and in 1736 they formally subscribed the decrees of the Council of Trent. Nevertheless, they retain their distinctive national rites and usages, and use the ancient Syriac language in their liturgy; their clergy, if married before ordination, are permitted to keep their wives; and they have many festivals and saints not recognised in the Roman calendar. The Maronites, a sturdy, warlike race of mountaineers (see LEBANON), number about 250,000. Their patriarch, who is elected by their bishops, subject to the approval of Rome, resides in the convent of Kanobin on Lebanon. Many convents for both sexes are spread over the country, especially in the neighbourhood of Bsherreh, above Tripoli; the inmates follow the rule of St Anthony. The relations of the Maronites with their implacable foes, the Druses, have been already detailed under DRUSES and LEBANON. See Baedeker's *Palestine*, by Socin (2d ed. 1880).

Maroons, the name (derived from the Span. *cimarron*, from *cima*, 'a mountain top') given in Jamaica and Guiana to fugitive negro slaves. When the British conquered Jamaica from the Spaniards in 1655, numbers of slaves took refuge in the uplands. They and their descendants, called Maroons, maintained a constant warfare with the colonists for 140 years; but in 1795 they were subdued, and a portion of them removed to Nova Scotia, and afterwards to Sierra Leone. The remnant fraternised with their manumitted brethren in 1834–35. The Maroons of Guiana, who are generally called Bush Negroes, about 4000 altogether, form a number of independent communities. See Dallas, *History of the Maroons* (1803).

Maros-Vasarhely, capital of the Szekler districts in Transylvania, stands on the Maros, 28 miles SE. of Klausenburg. It contains a fortified castle, an old Gothic church (Reformed), a library of 70,000 volumes, and a collection of minerals and antiquities, and has a trade in timber, tobacco, wine, corn, and fruits (particularly melons). Pop. (1881) 12,883.

Marot, CLÉMENT, a distinguished French poet of the time of Francis I., was born at Cahors in 1496 (?). Largely owing to the influence of his father, who was both poet and courtier, he began at an early age to write verses, and, abandoning his legal studies, entered the service of Margaret, Duchess of Alençon, afterwards Queen of Navarre, to whom many of his poems are addressed. He was wounded at the battle of Pavia in 1525, and at the end of the year was imprisoned on a charge of heresy, but was liberated in the spring of 1526. Having a witty pen and a satiric turn, and not being particularly prudent either in speech or conduct, he made many enemies and gave his royal patrons considerable trouble. During his absence from Paris in 1535 his house was searched, and compromising literature was found in his library. His claim that a poet should be permitted to read everything being disallowed, he fled, first to the court of the Queen of Navarre, and later found refuge with the Duchess of Ferrara. He returned to Paris in 1536, and in 1538 began to translate the Psalms, which in their French dress became very popular, especially at the court, where they were sung to favourite secular airs, and helped to make the new views fashionable at least. He was encouraged by the king to continue his translation, but the part published in 1541 having been condemned by the Sorbonne, he had again to flee in 1543. He made his way to Geneva, but, finding Calvin's company uncongenial, he went to Turin, where he died in 1544. His poems consist of elegies, epistles, rondeaus, ballads, songs, sonnets, madrigals, epigrams, nonsense verses, and longer pieces of a general character; and, though he himself tells us that love was above all his master, his special gift lay in the direction of badinage and graceful satire. Marot has a singularly light touch, and a great power of simple natural expression, and in all his poems—if we except some early rhetorical exercises—there is the distinctive *style Marotique* which has had an important influence on French literary language. Though he was persecuted for his religious views, he expressly declares that he was not a Lutheran, and probably like many of his friends—Dolet for instance—he had no very definite theological beliefs.

See *Œuvres Complètes* (4 vols. Paris, 1873–75); *Œuvres Choisies*, an admirable selection (Paris, 1826); Life by Vitet (1868); Douen, *Clément Marot et le Psautier Huguenot* (2 vols. 1879). Of Guiffrey's costly edition only two volumes had appeared in 1890.

Marozia, a Roman lady of noble birth, but of infamous reputation in the scandalous chronicles of her age, daughter of the equally notorious Theodora, was born in the close of the 9th century. As the mistress of Pope Sergius III., and mother and grandmother of three popes (John XI., John XII., and Leo VII.), she exercised the greatest influence on the political affairs of her time in Italy. She was married three times, and, if we may credit the narrative of Luitprand, had skill and address enough to procure the deposition and death of Pope John X., and subsequently the elevation of her son as John XI. Marozia's later years brought on her the punishment of her crimes. She died in prison at Rome in 938.

Marprelate Controversy, a bitter war of vigorous and often homely pamphlets, waged against official Episcopacy by the Elizabethan Puritans. Many of these were written by deprived ministers, but were published under the comprehensive name of Martin Marprelate. The time of greatest activity was about 1589, and the books were printed in spite of severe government repression, successively at Moulsey near Kingston-on-Thames, Fawsley in Northamptonshire, Norton, Coventry, Welstone in Warwickshire, and in or near Manchester. The names of the chief writers were John Penry (hanged), John Udall (left to rot in jail), Fenner, John Field, and Job Throckmorton who wrote *Hae ye any Work for Cooper?* One of the best attempts to answer the Marprelate writers was Bishop Cooper of Winchester's *Admoni-*

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tion to the People of England. Other writers on the same side were John Lilly and Thomas Nash. Bacon presented to the ministry in 1590 his wise paper entitled *An Advertisement touching the Controversie of the Church of England*, an admirable argument for moderation and mutual concession in things indifferent. 'First of all,' he says, 'it is more than time that there were an end and surcease made of this immodest and deformed manner of writing lately entertained, whereby matters of religion are handled in the style of the stage.' Professor Arber has included a reprint of the Marprelate tracts in his 'English Scholar's Library.' See the Rev. W. Maskell's *History of the Marprelate Controversy* (1845).

Marque, LETTER OF. See LETTER OF MARQUE.

Marquesas Islands, or MENDAÑAS, are a group in Polynesia, N. of Tuamotu or Low Archipelago, between 8° and 11° S. lat. and 138° and 141° W. long. The name strictly applies to four or five islands discovered by Mendaña in 1595, but usually includes now the Washington group of seven islands, to the north-west, which were discovered by the American Ingraham in 1797. Total area, 492 sq. m. The whole archipelago is volcanic. Hiva-oa and Nuka-hiva are the largest islands. Nearly all are shaped into several narrow valleys, in which the bulk of the population, 5216 in 1885, live. In Cook's time there were 100,000 inhabitants, but in 1838 they had decreased to 20,000. They are perhaps the finest race of the brown Polynesian stock, and, though courteous, are cruel and revengeful. Since 1842 the islands have been a French protectorate. A little cotton is grown by Chinese immigrants.

Marquetry. See INLAYING.

Marquette, capital of Marquette county, Michigan, is on the southern shore of Lake Superior, 430 miles by rail N. of Chicago. It has foundries, blast-furnaces, &c., besides sawmills and machine-shops, and a slate-quarry. Iron ore in very large quantities is mined in the county and shipped from here. Marquette is the seat of a Roman Catholic bishop. Pop. (1884) 5690.

Marquis, or MARQUESS, the degree of nobility which in the peerage of England ranks next to duke. Marquises were originally commanders on the borders or frontiers of countries, or on the sea-coast, which they were bound to protect. In England there were marquises or lords-marchers of the borders of Scotland and Wales in the reign of Henry III., and the foreign equivalent *Markgraf* was common on the Continent; but the first English marquis in the modern sense was Robert de Vere, Earl of Oxford, who was created Marquis of Dublin by Richard II. in 1385. The title was first introduced into Scotland in 1599, when the Marquises of Huntly and Hamilton were created. For the coronet of a marquis, see CORONET. The mantle is scarlet, with three and a half doublings of ermine. A marquis is styled 'The Most Honourable;' his wife is a marchioness; his eldest son takes by courtesy the next lower title in the peerage, except where that is identical with the title of the marquisate, in which case he must take the next lower still. The younger sons of a marquis are styled 'Lord,' and daughters 'Lady,' with the addition of Christian name and surname.

Marr. See MAR.

Marriage denotes the union of man and woman in the legal relation of husband and wife as the same may be defined by local law or custom. The term may be properly applied to connections between the sexes which to civilised people seem exceedingly slight and loose, provided that they are founded on contract, are intended to endure, and are approved of, or at least permitted, by public or group opinion; but these are conditions essential to marriage. It is not strictly applicable to cases in which the wife is got by capture; for no relations or consequences that can be called legal can arise out of an act of violence which arouses resentment and provokes to retaliation; but, if the captor's tribe approve, there may be *de facto* marriage in such cases, and true marriage if, in addition, the tribe of the woman acquiesces in the capture when effected, in which case an approach is made to marriage with the form of capture—i.e. marriage proceeding upon a contract, but carried out through a form or pretence of capturing the bride.

Many nations have had traditions of a time when marriage was unknown among their own predecessors, and of some lawgiver to whom its institution was ascribed, who was, for example, among the Egyptians, Menes; among the Chinese, Fo-hi; among the Greeks, Cecrops; among the Hindus, Svetaketu. And (if man had to work out his own institutions) it is plain that societies everywhere would need time for arriving at those regulative customs, in the absence of which there would be no marriage, and neither right nor wrong in matters of sex; much time, indeed, wherever there prevailed that law of incest (exogamy) which cut off men from marrying all women of their own kindred, however remote the relationship, the women among whom their connections must have been made at first. Darwin, founding upon observation of the higher animals, was of opinion that, before the springing up of marriage custom, the jealous rage of the male would determine that there would be no general promiscuity of the women, and that there would at first be a prevalence of polygyny. It should, however, be remembered that among early peoples and backward peoples, with marriage fully defined, jealousy has often been practically unknown. Observation of men, savage and civilised, would perhaps suggest that, before some notion of right in matters of sex had sprung up, there would be no uniform behaviour in those matters, that men would do as they could, as passion prompted and opportunity offered, and that they would not be over-scrupulous in their connections—i.e. that they might be polygamists, polyandrists, or monogamists according to circumstances, and that there would be as much promiscuity as there was opportunity for.

An attempt to show in outline the history of marriage and of kinship has necessarily been made under the head of Family (q.v.), and to that reference must here be made. In that account the beginnings of marriage are traced to the predominance of a modification of promiscuity, to Nair polyandry, or something equivalent to it, which could yield a system of kinship through females only—a limitation of kinship which can only have become established when there was usually no father in the household, and fatherhood was uncertain, not thought of, or not claimed. Ultimately, in advanced societies everywhere, marriage came to be regarded as not to be duly constituted without a religious sanction.

While the law of exogamy forbids a man to marry any woman of his own kindred, a law which has been named endogamy forbids a man (where it prevails) to marry any woman who is not of his kindred. Endogamy has been widely prevalent, and not among rather advanced populations only, but among many which are decidedly backward; but there are indications, often conclusive, of its having been preceded by exogamy, and it may be taken to have been preceded by it at least in most cases. Exogamy, if this be conceded, has

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prevailed at one time or another nearly everywhere. The known cases in which peoples have depended for their wives upon capture, or have, after a contract for marriage, gone through the form of capturing the bride (which undoubtedly is a relic of capture), are a most extensive class; and exogamy gives the explanation of all such cases. Exogamous men having unfriendly neighbours might have to go without wives if they did not capture women from their neighbours; and when these also were exogamous, we may believe that in time captures would be made easy—that reciprocal captures would be more or less arranged, until at length there were contracts made for exchange or purchase of women, and the capture became a form only. As a form capture has in fact lingered on, in shapes more or less distinct, in the marriage ceremonies of many modern peoples. For an attempt to show the origin of the law, which had the remarkable effect of interdicting marriage between all men and women of the same blood or kindred, see *The English Historical Review*, No. 9, January 1888; and *The Origin of Exogamy*, by J. F. M'Lennan.

This account of exogamy takes it to have been in the first instance an interdict upon wiving only; but the difficulty is rather to see how men came to abstain from marrying their own women than how, that point reached, they afterwards went on to abstaining from them altogether. Of course, it had to be kept in view that the law of exogamy must have been, in fact, a practice which became prevalent and then obligatory, and that, while it was growing up, the practice must have been the same that it was after it had got the force of law, so that, if exogamy at first necessitated a practice of capturing wives, it must have been a practice of capturing wives that became consolidated as exogamy. Groups composed of a single totem kindred, when exogamous (see FAMILY), could only get wives by capture. And thus it was a practice (1) of capturing women of stranger groups for wives, and (2) of taking for wives only stranger or foreign—i.e. captured—women that had to be accounted for. A long-continued scarcity of women (which infanticide might account for) is suggested as the explanation of a systematic practice of capture, and the position of men relatively to captured women on the one hand, and their own women (these being scarce) on the other, as the explanation of marriage being ultimately confined to captured or foreign women. What is scarce is of importance, and the position of women among their own kinsmen must have tended to be high, so that something like the Nair relation only could be formed with women by their kinsmen, and that it may be without any contract, practically, at anyrate, at the woman's mere choice. The captured woman, on the other hand, would be a slave; the captors could have her as a subject wife, absolutely on their own terms. It is this sort of connection that was destined to prevail, to become the type of marriage, and it was the lot of the captive, not of the kinswoman. To subject the latter to it would have been an outrage, an offence against her and the kin, indeed, even at first what we call a sin; and the practice which at first exempted her, when it became consolidated as custom, excluded her from the condition of wife to any of her kinsmen, with the feeling remaining, and grown intense, that it would be a shocking and sinful thing for them to have her in that condition. The passage from this to the disuse of the Nair or quasi-Nair connections between men and their own women which would have continued while marriage was growing up—and probably until after convenience had made capture easy, i.e. more or less of a form, when there would be practically exchange of women—and then to the interdiction of such connections, time being given, does not appear to present much difficulty. Moreover there are a few cases known in which all marriage between relatives being forbidden, other connections seem not to be excluded. This account of exogamy is, at anyrate, founded at every point upon human nature and its observed tendencies. The scarcity of women which is the basis of it is also the basis of the history of marriage which traces that institution back to polyandrous beginnings.

See works cited at FAMILY, and in addition, Darwin, *Descent of Man* (1870); Fison and Howitt, *Kamilaroi and Kurnai* (1880); A. Lang, *Custom and Myth* (1884); Max. Kovalevsky, *De l'Origine de la Famille et de la Propriété* (1890).

The solemn and binding nature of marriage is recognised by all civilised peoples; and, although in various countries there is vast difference in details, both as to legal obligations and public ceremonies, there is much substantial agreement. Thus the restrictions as to age, consanguinity, &c. which prevail in England and other modern countries were nearly the same in the Roman law, where, however, the consent of the *paterfamilias* was an essential. The canon law regards marriage as a sacrament and not as a contract; but it recognises the validity of marriage by mere consent, and without ecclesiastical sanction, in countries where such marriages are treated as valid.

England.—A promise of marriage, given in exchange for the promise of the other party, is binding in English law. Performance is not enforced, but damages may be recovered for breach of promise. It is not necessary that the promise should be proved by writing. The parties may give evidence, but the plaintiff cannot recover unless his or her testimony is corroborated by some other material evidence. If either party discovers that the other has been guilty of gross misconduct, or of serious misrepresentation in regard to his or her circumstances and previous life, breach of promise may be justified. It has been held that a bodily infirmity, rendering it dangerous for the defendant to marry, is no defence to an action.

Males of fourteen and females of twelve, not subject to any physical or mental incapacity, are permitted to contract marriage; but for the marriage of a minor the consent of parents or guardians ought previously to be obtained (see INFANT). Persons already married are, of course, incapable of marrying again, unless set free by death or by Divorce (q.v.). A man may not marry his mother or other ascendant, his daughter or other descendant, or any woman within the third degree of consanguinity. He is also precluded, by reason of affinity, from marrying any woman related as ascendant, descendant, or blood-relation within the third degree to a deceased wife. Since 1835 marriages within the prohibited degrees are wholly void; it is not necessary that proceedings should be taken to annul any such union. The policy of the law which forbids a man to marry his Deceased Wife's Sister (q.v.) has been much questioned; and bills for legalising such marriages have several times been passed by the House of Commons.

Persons intending to marry are required to give notice of their intention; the forms commonly used for this purpose are banns, and the certificate of a superintendent-registrar. Banns (q.v.) are the subject of a separate article. Instead of giving notice to the parish minister, the parties may apply to a registrar or superintendent-registrar of the district in which they have resided seven days: if they reside in different districts application must be made in both. After twenty-one days the superintendent-registrar issues a certificate for the marriage: one shilling is paid

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for entry of notice, and one shilling for certificate. Parties desiring to be married without delay must obtain a license dispensing with the ordinary forms. The Archbishop of Canterbury may grant a special license (which is issued by his vicar-general) for marriage at any time or place. License for a marriage in church is obtained from a surrogate on an affidavit as to residence, absence of lawful impediment, and (if either party be a minor) consent of parents or guardians. A license may also be obtained on giving one day's notice to the superintendent-registrar, and making a declaration as to residence, &c. The fees payable for licenses are considerably higher than those paid for banns and for the ordinary certificate. It is to be observed that the registrar cannot give a license for marriage in church. His ordinary certificate is usually accepted in lieu of banns; but a clergyman may insist on banns or episcopal license when the marriage is in church.

In the actual celebration of marriage the law requires that the ceremony take place between 8 A.M. and 3 P.M. (12 A.M. until 1886), that the parties declare that they know of no impediment to their marriage, that formal words of consent be used in the presence of witnesses, and that the marriage be duly registered. If the marriage is in church, the prayer-book service is used, and the minister enters the marriage in the register. If it is in a Nonconformist chapel or other registered building, a registrar must be in attendance. Persons who wish to be married according to a secular form may be married at a register office, in presence of a superintendent-registrar, and of a registrar and two other witnesses. Persons so married may afterwards go through a religious ceremony, but such ceremony is not a marriage, in the legal sense of the word, and therefore must not be registered. In 1868 a Royal Commission reported on the marriage laws of the United Kingdom, pointing out the grave inconveniences resulting from the maintenance of different laws in England, Scotland, and Ireland, and from the uncertainty of the English law. The excessive formality of the statute law is in some degree neutralised by the rule that a marriage is not avoided unless for some fraud or irregularity of which both parties are cognisant. Thus, a man who is married in a false name is duly married, unless the wife is a party to the deception; and it has been held that a marriage in church, without banns or license, is valid, if the wife is under the belief that the husband has complied with the necessary legal forms. For further particulars in regard to forms, see Hammick's *Marriage Law of England*; and for the legal effects of marriage, see the article HUSBAND AND WIFE.

A marriage celebrated in church by a person professing to be in holy orders, and not known by both parties to be an impostor, is valid. If both parties acquiesce in the celebration of marriage by a pretended clergyman, the marriage is void. Marriage by proxy is not known to English law, and if it were thought desirable to permit such a marriage in the case of a sovereign or other person of exalted rank, a special act of parliament would probably be passed for the purpose. When one party is a Protestant and the other a Roman Catholic, it was formerly not unusual to arrange for two religious ceremonies; but the Roman Catholic clergy now decline to officiate in such cases, unless the parties promise that there shall be no Protestant ceremony. The Anglican clergy being no longer the sole authoritative registrars, the repetition of the Catholic marriage in an Established church is not now tolerated. For papal dispensations granted to Catholics, see DISPENSATION.

In regard to marriages celebrated abroad, and marriages in England where the parties, or one of them, may be of foreign nationality, it is important to observe that the law of the parties' domicile governs the essentials of the marriage (capacity of the parties to contract marriage, &c.), and that the law of the place of celebration governs the forms with which the marriage must be solemnised, except in the case of a marriage celebrated in an ambassador's house, or other place enjoying the privilege of ex-territoriality. It is not always easy to say what are the essentials of a marriage, and what rules and ceremonies are to be considered merely formal. French law, for example, requires persons about to marry to obtain, or at least to apply for, the consent of their parents. A Frenchman is married in England without asking his parents' consent. It may be said that he has only omitted a formality not required by English law; but the French courts hold in such cases that an essential requisite of valid marriage is wanting. It is obviously most inconvenient that persons deemed to be married in one country should be considered unmarried in another; the 'conflict of laws' as to marriage and divorce is the cause of much hardship and injustice.

Scotland.—The law of Scotland regards marriage as a contract constituted by the consent of the parties alone. In its effects it differs from other contracts in respect that it confers upon the parties a certain distinct status, and inasmuch as its duration and legal consequences cannot be changed at the will of the parties. This is what is referred to when marriage is said to be an institute or something more than a contract. As the free consent of the parties is necessary, marriage is impossible when those elements are present which the law regards as involving incapacity to give consent. Thus idiots and mad persons cannot marry, and a marriage to which the assent of one or other of the parties has been gained by fraud, force, or fear, or error as to some essential matter, will be void. Intoxication, if the person is so drunk as not to know what is being done, also invalidates a marriage. Pupils—i.e. females under twelve and males under fourteen—cannot marry; but, if the parties are of marriageable age, the consent of their parents or guardians is not necessary. Besides these incapacities, specially affecting the nature of the consent given, and attaching to marriage in common with all other contracts, there are others peculiar to marriage only. Thus, impotency renders a marriage void, and a previous marriage, while it subsists, prevents either of the parties from lawfully contracting another; marriage between adulterers is forbidden by an old statute (regarding which, however, doubts have been expressed as to whether its force is not gone by desuetude), and relationship within certain degrees prevents the relations from marrying. The forbidden degrees, as in England, are drawn from the Jewish law as set forth in the Book of Leviticus (see above). A further preliminary requisite to a valid marriage is that one or other of the parties shall have resided in Scotland for a term immediately preceding the marriage. This term varies according to the form which the marriage takes. An irregular marriage is not good unless one of the parties either had his or her usual residence in Scotland, or lived there for twenty-one days before the marriage. In the case of a marriage after proclamation of Banns (q.v.) the session-clerk cannot proclaim banns until the parties have resided in his parish for six weeks. Where publication of notice by the registrar takes the place of banns parties must reside for fifteen days in the district before intimating to the registrar their intention to marry, and seven further days must elapse before the marriage takes place.

As regards the manner of contracting marriage the law of Scotland is peculiar among those of

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other nations for the freedom which it allows to the contracting parties. If their present consent to marry is proved, the law requires no special form of proof, imposes no restrictions as to time and place, and enjoins no special mode of celebration. The blessing of the church is not required by the law of the land to make a marriage good; although all marriages celebrated without the assistance of a clergyman are called irregular marriages. It is enough that the parties give their free consent to marry each other. If a man and woman have lived together as husband and wife, and have had the reputation among their neighbours of being married to one another, and this reputation is general in the neighbourhood, uncontradicted by any one and of considerable duration in point of time, these parties will be held to have exchanged a consent to marry, and the courts will declare them to be married. This is called marriage by habit and repute. Where a promise to marry has been given and sexual intercourse between the parties has followed in Scotland, upon the faith of the promise, the court, upon proof of the promise by the writing or the oath of a defender, will declare the parties to have been married, the presumption of the law being that the intercourse has taken place only on an interchange of consent to marry. This is called marriage by promise *subsequente copula*. Cases of marriage by habit and repute or by promise *sub. cop.* are very rare. In the general case, the fact of the interchange of consent to marry is not left to be presumed by law, but is proved in the most unequivocal way either by writing or witnesses. These cases are distinguished as marriages by words of present consent *per verba de presenti*. According to this form persons may marry by declaring, with or without witnesses, that they then consent to marry and do marry, or by making a written declaration to that effect, and acting upon their declaration. This method of interchange of words of present consent was the one followed in the Gretna Green (q.v.) or 'over the border' marriages by runaways from England. They were checked by Lord Brougham's Act of 1856, requiring residence in Scotland for twenty-one days as a pre-requisite to the validity of an irregular marriage. But if this condition be fulfilled they are still possible. Persons who marry in this way may be convicted before a magistrate or justice of the peace of having contracted an irregular marriage; and, as the conviction is recorded in the books of the court and stands as evidence of the marriage, this way of getting married—by declaration and a police-court conviction—has been thought to be the cheapest known way of securely tying the bonds of wedlock, since it entails no necessary fees to any functionary. But persons convicted of an irregular marriage are required to register their marriage, and the registrar is entitled to a fee of twenty shillings. Parties to an irregular marriage may apply within three months after its date to the sheriff for a warrant to register their marriage. The sheriff grants warrant upon proof of the marriage by written declaration; and a certified copy of the entry in the register is declared by statute to be evidence of the marriage. The proceeding of applying to the sheriff for warrant to register is often believed by the parties to be a civil ceremony of marriage, and popular language speaks of couples having been married by the sheriff. By a mistaken notion and confusion with the English forms of marriage this 'marriage by the sheriff' is sometimes referred to as 'marriage by special license,' sometimes as 'marriage before the registrar,' while the truth is that the parties have married themselves, and only apply to the public functionaries to make their marriage a matter of public record.

Cases of irregular marriage by interchange of words of consent, though much more common than those of marriage by habit and repute or by promise and *copula*, are rare in comparison with marriages celebrated by clergymen. These are forms of marriage by the interchange of words of consent; the law not regarding the presence of a clergyman or the sanction of the church as necessary to marriage. If a clergyman officiates at a marriage he may do so only after the publication of Banns (q.v.) or publication of notice by a registrar as in England. If he do so without these preliminaries the marriage becomes a clandestine marriage, and the clergyman and the parties are subject to penalties. When notice to the registrar of an intention to marry takes the place of banns, the notice is entered in a Marriage Notice Book, and publicly posted on the registrar's office for seven days, after which time, if no objections are taken, the registrar issues a certificate of publication of notice which authorises a clergyman to marry the parties producing it. There is now no provision of law restraining clergymen of other churches than the Established Church of Scotland from celebrating regular marriages. While regular marriages are always treated in law as marriages 'in the face of the church,' it is not the practice to solemnise Presbyterian marriages in church, nor is such a solemnisation necessary to make a marriage regular and lawful. The ceremony is usually conducted by a clergyman at the house of the bride's father; although of late years there have been signs that Presbyterians may come to adopt the custom of marrying within the church walls. The proceedings ought to include, and usually do include, an express inquiry whether the parties consent to marry; a declaration by them, given generally by a nod or a curtsy, that they do consent; a solemn admonition by the clergyman; a declaration by him that the parties are married; and the nuptial benediction. The ceremony should take place in the presence of witnesses who know the parties, and who are capable of giving evidence. After the marriage is solemnised (which may take place any hour of the day), a schedule, which is given out to the parties along with the certificate of publication of banns, or of publication of notice by a registrar, has to be presented, filled up, to the clergyman; signed by the parties, the clergyman, and at least two witnesses, and delivered to the parties, who must transmit it within three days, under penalties, to the registrar of the parish in which the marriage is solemnised. See HUSBAND AND WIFE, DIVORCE.

Ireland.—The law of Ireland as to the constitution of marriage is substantially the same as that of England. The form of celebration may differ according as the marriage is solemnised in the Disestablished Church of Ireland, the Roman Catholic, or the Presbyterian Church; or between persons of different religious persuasions; but the legal rights and duties of the several churches with regard to marriages are now practically the same—to provide for publication of a marriage and for its solemnisation between certain hours in a building set apart for divine service.

United States.—In the United States the general rule in almost all the states is that no specific form is necessary to the constitution of marriage if the consent of the spouses is proved. But marriage differs from contract in that it cannot be modified or dissolved by consent, nor rescinded on proof of fraud. The law in some states requires that marriages be authorised by taking out a license, and solemnised before a magistrate or a clergyman. Pennsylvania provides that marriages must be

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solemnised before twelve witnesses. But a marriage good at common law is good notwithstanding any statute on the subject, unless the statute contain express words of nullity. The original law of the prohibited degrees has been modified; and the prohibition of marriage with a deceased wife's sister is all but unknown.

See the articles

Adultery.	Concubinage.	Jointure.
Affinity.	Consanguinity.	Judicial Separation.
Banns.	Divorce.	Legitimation.
Bastardy.	Fleet Marriages.	Polygamy.
Bigamy.	Husband and Wife.	Settlements.
Celibacy.	Illegitimacy.	Wedding.

Marrow is a substance of low specific gravity filling the cells and cavities of the bones of mammals. There are two varieties, which are known as *red* or *watery marrow* and *yellow* or *oily marrow*. In some of the short bones, as the bodies of the vertebræ and the sternum, the marrow has a reddish colour, due to the presence of cells which have this colour and are supposed to be transition forms between the proper marrow cells and red blood-corpuscles. On analysis it is found to contain 75 per cent. of water, the remainder consisting of albuminous and fibrinous matter, with salts and a trace of oil. In the long bones of a healthy adult mammal the marrow occurs as a yellow, oily fluid, contained in vesicles like those of common fat, which are imbedded in the interspaces of the medullary membrane—i.e. a highly vascular membrane lining the interior of the bones. This marrow consists of 96 per cent. of oil and 4 of water, connective tissue, and vessels.

Marrow Controversy, one of the most strenuous and memorable struggles in the religious history of Scotland, took its name from a book entitled the *Marrow of Modern Divinity*, written by a Puritan soldier in the time of the Commonwealth. The highly evangelical character of this work, and especially its doctrine of the free grace of God in the redemption of sinners, had made it a great favourite with the few zealous and pious ministers then to be found in the Church of Scotland, and in 1718 an edition was published by the Rev. James Hog of Carnock. A committee of the General Assembly reported against the work as too free in its offer of salvation, and the Assembly formally condemned the book. Twelve ministers, amongst whom were Thomas Boston (q.v.) and the Erskines (q.v.), protested against this decision, and were ultimately rebuked by the Assembly, the national sympathy being on the whole with the 'Representers' or 'Marrow-men.' The controversy was substantially the same that, in 1733, resulted in the deposition of Ebenezer Erskine, and the origination of the 'Secession' body.

Marrum. See REED.

Marryat, FREDERICK, was born in Westminster on July 10, 1792. He was the second son of Joseph Marryat, M.P. for Sandwich and colonial agent for the island of Grenada. In 1806 he went to sea as a midshipman under Captain Lord Cochrane on board the *Impérieuse* frigate. He spent some years of active and dangerous service under his famous captain on the north-west coasts of France, on the north coast of Spain, and in the Mediterranean, taking part in many of the incidents which he afterwards described in *Frank Mildmay* and *Mr Midshipman Easy*. 'The cruises of the *Impérieuse*,' he wrote in his private log, 'were periods of continued excitement from the hour in which she hove up her anchor till she dropped it again in port; the day that passed without a shot being fired in anger was with us a blank day; the boats were hardly secured on the booms than they were cast loose and out again.' After visiting West Indian waters in the *Æolus* and *Spartan* frigates he received a lieutenant's commission in 1812, and was soon after appointed to the sloop *Espiègle*, in which he cruised on the north coast of South America. He was twice invalided home, but was appointed commander at the age of twenty-three, in 1815, at the close of the great war. In 1819 he married Miss Shairp, the daughter of a Scotch gentleman, and was then appointed to the *Beaver* sloop, which was kept cruising off St Helena to guard against the escape of Napoleon. After doing good work in suppressing the channel smugglers in the *Rosario* he was sent out in command of the *Larne* to Burma, where his men suffered severely in river-work and stockade-fighting. On his return to England his services were rewarded by the Companionship of the Bath and the command of the *Ariadne*, of twenty-eight guns. He resigned in 1830 and never afterwards applied for a ship, but settled in Sussex House, Hammersmith, and thenceforth led the life of a man of letters. *Frank Mildmay*, his first novel, appeared in 1829, and the *King's Own* in 1830. In 1832 he became editor of the *Metropolitan Magazine*, to which he contributed *Newton Forster* (1832), *Peter Simple* (1833), *Jacob Faithful*, *Japhet in Search of a Father*, and *Mr Midshipman Easy* (1834). After living for some time abroad he severed his connection with the *Metropolitan Magazine*, and wrote for the *New Monthly* at the rate of £20 a sheet. *Snarley Yow* and *The Pasha of Many Tales* came out in 1836, and in 1837 Marryat set out for a tour through the United States, where he remained for two years, and where he wrote *The Phantom Ship* (1839) and a drama, *The Ocean Waif*, which was produced at a New York theatre. His literary work was fairly remunerative: he received £1400 for *Mr Midshipman Easy*, £1600 for his *Diary in America*, and similar sums for his other books. But he was extravagant and unlucky in his speculations, and he lost heavily through his estate of Langham in Norfolk. During his later years his means were greatly narrowed, and his life seems to have been shortened by overwork. His *Diary in America* was issued in 1839, and was followed before the close of 1842 by *Poor Jack*, *Masterman Ready*, *The Poacher*, and *Percival Keene*. In 1843 he settled on his Norfolk property, where he spent his days in farming and in writing stories for children. He published *Settlers in Canada* in 1844, *The Mission* in 1846, *The Privateer's Man* in 1846, and the *Children of the New Forest* in 1847. *Valerie* was only partly Marryat's; and *Rattlin the Reefer*, though included in the list of his novels, was written by E. Howard, his sub-editor on the *Metropolitan Magazine*. His health broke down in 1847, and, after rupturing several blood-vessels, he died at Langham on August 9, 1848. He was an excellent officer and a generous man, though quick-tempered, extravagant, and over-eager in the pursuit of enjoyment.

As a writer of sea-stories Marryat has no superior. He cannot, it may be, bring fully home to his readers the beauty and the terror of the deep. But for invention, narrative skill, and grasp of character, and especially for richness of humour, he stands first of all those who have dealt with the sea and sailors in prose fiction. No doubt his fun often descends to farce; still, setting Dickens aside, there is no English novelist who has awakened heartier and honester laughter. His happiest creations, Mr Chucks, for example, and Terence O'Brien, and Mr Easy and Mesty and Equality Jack would not unworthily fill places in the gallery of the greatest novelist. His best books are thoroughly sound in workmanship. They betray no sign of straining after effect; the prose is direct, clear, and vigorous, an ideal, in its way, of the narrative of adventure. Nothing, for example, could well be

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more vivid, yet nothing could well be simpler and more reserved in style, than such a passage as the club-hauling of the *Diomede* (in *Peter Simple*), where —as is usual in Marryat—the excitement and peril of the moment are brought home to you in the tersest phrase, by dramatic flashes and apt touches of dialogue. His sea-fights, his chases and cutting-out expeditions, are told with irresistible gusto. The writing is as unpretentious as it is spirited and truth-like. You have only to compare the action between the *Rattlesnake* and the three schooners (in *Peter Simple*), or the fight between the *Aurora* and the *Trident* (in *Midshipman Easy*), with Fenimore Cooper's attempts in the same line to be convinced of Marryat's immense superiority as an artist. His books have been the delight of boyhood since they first appeared; and you can turn to them in after years confident of a renewal of past enjoyment. The sailors of the Great War live in his pages as vividly as certain ranks and classes of Londoners live in the pages of Dickens.

See *Life and Letters of Captain Marryat* (1872), by his daughter Florence Marryat, herself a prolific novelist; and the *Life of Captain Marryat*, by David Hannay ('Great Writers' series, 1889).

Mars (archaic and poetic *Mavors;* in the song of the Arval Brothers, *Marmar;* the Oscan form is *Mamers*), an ancient Italian divinity of war and of husbandry, identified by the Græcising Romans with Ares (q.v.). As the father of Romulus he was specially the progenitor of the Roman race, and he shared with Jupiter the honour of being styled *Pater*, the forms *Marspiter* and *Maspiter* being common for *Mars Pater*. Other titles were *Mars Gradivus*, as the warlike god; *Silvanus*, as the rustic god; and *Quirinus*, from his relation to the state, and his especial care for Roman citizens in their civil capacity as *Quirites*. His priests, the *Salii*, danced in complete armour. The wolf and the woodpecker were sacred to him. He had many temples at Rome, the most celebrated of which was that outside the *Porta Capena*, on the Appian Road, and that of Mars Ultor built by Augustus in the forum. The *Campus Martius*, where the Romans practised athletic and military exercises, was named in honour of Mars; so was the month of March (*Martius*), the first month of the Roman year. The *Ludi Martiales* were celebrated every year in the circus on 1st August. See PLANETS.

Mars, MADEMOISELLE. Anne Françoise Boutet-Mouvel, a great favourite at the Théâtre Français during the first forty years of the 19th century, was born in Paris on 5th February 1779, the illegitimate daughter of an actor Moutet and an actress Mars. She began to act before she was thirteen, joined the Théâtre Français in 1799, and died at Paris on 20th March 1847. She was equally mistress of naïve parts as of those of the coquette, and was especially successful in Molière's masterpieces. Her *Mémoires* were published in 2 vols. in 1849, and her *Confidences* in 3 vols. in 1855.

Marsala, a seaport on the westernmost point of Sicily, 102 miles by rail and 55 as the crow flies SW. of Palermo. Pop. of town (1881) 19,750; of commune, 40,250 (34,200 in 1871). It is defended by a citadel, has a cathedral and an academy of sciences, and carries on a large trade in wine, the well-known Marsala, which became popular from having been supplied to the British fleet in 1802. It resembles sherry, and is exported principally to England and the West Indies. The town occupies the site of Lilybæum, the ancient capital of the Carthaginian settlements in Sicily, and was selected by Garibaldi as his landing-point for the Sicilian campaign of 1860. It obtained its present name from the Saracens, who occupied it in the 9th century, but were driven out by the Normans in the 11th. The harbour was filled up by Charles V. in 1567 to prevent a Turkish attack; it was reconstructed during the 19th century. On an average some 1960 vessels of 165,300 tons burden (one-fifth British) enter every year, bringing chiefly staves, grain, and spirits to the annual value of £58,960. The total exports reach an annual value of £434,750, of which £431,720 is for wine.

Marseillaise, the stirring song or hymn of the French republicans, was composed, six-sevenths of it, in 1792, by a young officer, Rouget de Lisle (q.v.), then stationed at Strasburg. He composed both words and music under one inspiration one night in April after dining with the mayor of the city; *Chant de l'Armée du Rhin* was the name he gave it. The song was speedily carried by enthusiastic revolutionists to the chief cities of France. It was brought to Paris by the volunteers of Marseilles, who sang it as they entered the capital (30th July) and when they marched to the storming of the Tuileries. Hence the Parisians called it *La Marseillaise*, and as such it has become the official hymn of the republicans of France. More than one writer has called in question Rouget de Lisle's claim to have composed the music; but his originality seems to have been proved. Interdicted under the Restoration and the Second Empire, the Marseillaise became again the national song on the outbreak of the Franco-German war. See Le Roy de Sainte-Croix's monograph (1880) and Loth's inquiry into its real author (Paris, 1886).

Marseilles, in point of population the third city of France, being surpassed by Paris and Lyons only, is the chief town of the department Bouches-du-Rhône, and is situated on the south coast, about 27 miles E. of the mouth of the Rhone. The principal commercial port of France, if not of the entire Mediterranean, Marseilles is entered annually by 8247 vessels (average for five years ending 1889) of 4,633,052 tons burden; of this commerce nearly three-fourths is French, the British being more than one-seventh. The total tonnage of Spain, Italy, Greece, and Holland together is only a little more than the British. The imports and exports together reach an annual value of 65 to 70 millions sterling, three-fifths being for imports. Wheat, oil-seeds, coal (300,000 to 345,000 tons), wine, spirits, and beer, sugar, maize, oats, barley, coffee, olive, palm, and cotton oils, pepper, flour, and tallow figure most prominently, in the order named, amongst the imports; whilst the exports consist chiefly of clay tiles, wheat, oil-cakes, flour, sugar, oil, wine and spirits, soap, and candles. Marseilles is the headquarters of the Messageries Maritimes, Générale Transatlantique, Marseillaise, and other great French commercial companies. An average of 29,790 emigrants, of whom only 1500 are French, embark from this port every year. The harbour accommodation consists of the old harbour, a natural basin of nearly 70 acres, running into the heart of the city; a series of new docks, quays, and warehouses (La Joliette, &c.) extending fully a mile along the shore to the west of the old harbour, and covering about a hundred acres; and an outer roadstead between the dams to these docks and a breakwater constructed in deeper water; besides dry-docks, wet-docks, slips, &c. The industry of the place is very considerable, the first place being taken by soap, vegetable oils, and oil-cake; soda, sugar, macaroni, iron, lead, zinc, tiles, and leather are manufactured. Several hundreds of men are employed in the flour-mills and in the wine-vaults. There is a prosperous fishing fleet.

The city of Marseilles is built on the slopes that overlook the old harbour, and at the foot, and has of late years extended to the south-east. Although greatly improved since 1853, the sanitary condition

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still leaves something to be desired. Its memorable buildings include the new Byzantine basilica, which serves as a cathedral; the pilgrimage church, Notre Dame de la Garde, with an image of the Virgin greatly venerated by sailors and fishermen, and with innumerable ex-voto offerings, built in 1864 on the site of an old chapel of 1214; the church of St Victor (1200), with subterranean chapel and catacombs of the 11th century; the health office of the port, with fine paintings by Vernet, David, Gérard, and Guérin; the museum of antiquities, in the Château Borély; the Longchamp palace, a very fine Renaissance building (1870), which shelters in one wing the picture-gallery, and in the other the natural history museum; the public library, with 95,000 volumes and 1530 MSS. The public institutions embrace a botanical and a zoological garden, a marine and an astronomical observatory, a faculty of sciences, and schools of medicine, fine arts, Oriental languages, music, commerce, hydrography. Pop. (1861) 260,910; (1881) 360,099; (1886) 376,143, including a colony of 40,000 Italians. Marseilles was the birthplace of Pytheas, Petronius, Thiers, and Puget.

One of the oldest towns in France, Marseilles was founded by Phoceans from Asia Minor six hundred years before Christ. It was for many centuries, down to 300 A.D., a centre of Greek civilisation. The Greeks called it *Massalia*, the Romans *Massilia*. As the rival of Carthage it sided with Rome. It supported Pompey against Cæsar, but was taken by the latter in 49 B.C., after an obstinate defence. During subsequent ages it fell into the hands of the Saracens (9th century), Charles of Anjou and Provence (13th century), Alphonso V. of Aragon (1423), and Henry III. of France (1575). In 1112 it had become a republic; but in 1660 it was deprived by Louis XIV. of the privileges it had enjoyed as a free port almost from its foundation. The years 1720 and 1721 are memorable for the devastations of the plague in the port, when nearly half the population of 100,000 perished, and for the splendid heroism of Bishop Belsunce and the Chevalier Rose. It was the scene of stirring events in 1792 and 1793, and sent large bands of cut-throats to Paris, besides keeping sufficient at home to carry on wholesale murders. In 1871 Marseilles, always notorious for its extreme republicanism and lawlessness, proclaimed the commune. Its commerce has grown rapidly since the conquest of Algiers and the opening of the Suez Canal.

See the statistical and historical works of Favre, of Boudin, and of Mathieu (1879), and the topographical account of Saurel (1884).

Marsh, GEORGE PERKINS, an American philologist, was born at Woodstock, Vermont, March 15, 1801; graduated at Dartmouth College, New Hampshire, in 1820; studied law in Burlington, Vermont; was elected to the Supreme Executive Council of the state in 1835, and to congress in 1842 to 1849. Whilst United States minister at Constantinople from 1849 to 1853 he was charged with a special mission to Greece (1852); in 1861 he was appointed the first United States minister to the newly-formed kingdom of Italy. He was made LL.D. by Harvard in 1859, and delivered courses of lectures on English philology at Columbia and at the Lowell Institute in Boston. He died at Vallombrosa in Italy, July 23, 1882. Marsh had a sound knowledge of English philology, and his chief works are valued equally on both sides of the Atlantic. These are his *Lectures on the English Language* (1861) and *The Origin and History of the English Language* (1862). Other works are *The Camel, his Organisation, Habits, and Uses* (1856), and *Man and Nature* (1864; largely rewritten, 1874). See *Life and Letters* by his widow (New York, 1888).

Marsh, MRS (*née* Anne Caldwell), was born about 1799 at Lindley Wood, Staffordshire; married the junior partner of the forger Fauntleroy; and between 1834 and 1857 produced a score of novels, of which the best were *Two Old Men's Tales, Emilia Wyndham* (1846; new ed. 1888), and *Norman's Bridge*. In 1858 she came into the Lindley Wood property, where she died in October 1874.

Marsh, OTHNIEL CHARLES, palæontologist, was born at Lockport, New York, 29th October 1831, graduated at Yale in 1860, and studied zoology, geology, and mineralogy for two years further at New Haven, and for other three years in Germany. He became the first professor of Palæontology at Yale in 1866, and thenceforward devoted himself to the investigation of extinct American vertebrates, of which in various expeditions to the Rocky Mountains he has discovered over a thousand new species, some representing wholly new orders. They include a new sub-class of odontornithes, a new order of pterodactyles (pteranodontia), the tillodontia and dinocerata, fossil monkeys from the Eocene of Wyoming, and several new families of Dinosauria (q.v.). Professor Marsh has described many of his discoveries in the *American Journal of Science*, and has issued a series of valuable monographs (published by government) on *Odontornithes* (1880), *Dinocerata* (1884), *Sauropoda* (1888), &c. He is LL.D. of Harvard, Ph.D. of Heidelberg, and in 1877 received the Bigsby medal of the Geological Society, London.

Marshal (Fr. *maréchal*; Old High Ger. *marah*, 'a battle-horse,' and *schalh*, 'a servant'), a term meaning originally a groom or manager of the horse, though eventually the king's marshal became one of the principal officers of state. The royal farrier rose in dignity with the increasing importance of the *cheralerie*, till he became, conjointly with the Constable (q.v.), the judge in courts of chivalry. When the king headed his army in feudal times, the assembled troops were inspected by the constable and marshal, who fixed the spot for the encampment of each noble, and examined the number, arms, and condition of his retainers. With these duties was naturally combined the regulation of all matters connected with armorial bearings, standards, and ensigns. In England the earl-marshal is now head of the Heralds' College (see HERALD), and the dignity is hereditary in the family of the Duke of Norfolk. In Scotland the office of marischal was hereditary in the family of Keith (q.v.). In 1716 George, tenth Earl Marischal, was attainted in consequence of his share in the rebellion of the previous year, and the office has since been in abeyance. In France the highest military officer is called a marshal, a dignity which originated early in the 13th century. There was at first only one *Maréchal de France*, and there were but two till the time of Francis I. Their number afterwards became unlimited. Napoleon's marshals are celebrated. From the title of this class of general officers the Germans have borrowed their Feld-marschall, and the British (since 1736) their Field-marshal (q.v.).

Marshall, capital of Harrison county, Texas, stands at the junction of three railways, 40 miles W. of Shreveport, Louisiana. It contains a ladies' college, and has railway machine-shops, foundries, and a trade in cotton. Pop. (1890) 7196.

Marshall, JOHN, chief-justice of the United States, was born in Fauquier county, Virginia, 24th September 1755, and was studying law when the Revolution began. He served as an officer—for a time under his father, Colonel Thomas Marshall (1730–1802)—from 1775 to 1779; in 1780 he received, while in Richmond, a license to practise

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law; and in 1781, after a final campaign, he settled down to his profession. He quickly gained distinction, and eventually rose to be head of the Virginia bar. From 1782 he sat in the Virginia House of Burgesses, the state council, the legislature; in 1788 he was elected to the state convention, which ultimately—mainly owing to his and Madison's (q.v.) arguments—adopted the new United States constitution. In 1797 he was appointed joint envoy, with Pinckney and Gerry (q.v.) to France, where he and Pinckney, as Federalists, were ordered to leave the republic, after the envoys had indignantly declined Talleyrand's overtures for a personal and a public loan. His conduct in this matter only made Marshall more respected and popular at home, and in 1799 he was elected to congress; on 12th May 1800 he was appointed secretary of state, which office he held till March 1801. In January 1801 he was appointed chief-justice of the United States, and this position he occupied until his death, at Philadelphia, 6th July 1835. Chief-justice Marshall's long series of important decisions are recognised as standard authority on questions of constitutional law; a selection was published at Boston in 1839. He prepared a Life of Washington (5 vols. 1804–7; revised ed. 2 vols. 1832) from papers placed at his disposal by the president's family. See *John Marshall*, by A. B. Magruder ('American Statesmen' series, Boston, 1885).

Marshalling of Arms. See HERALDRY.

Marshall Islands, a group in the western Pacific, bisected by 10° N. lat., and having the Caroline group to the west, consists of two parallel chains of low coral-reefs—one, the Ratak group, consisting of fifteen islands, and measuring in all 48 sq. m.; the other, the Ralik group, eighteen islands, with a total area of 107 sq. m. The cocoa-nut and pandanus palms and the bread-fruit tree are the principal sources of food, besides fish. Coprah is the only export (2800 tons annually). The inhabitants, 11,600 in number, belong to the Micronesian division, and are an ugly but good-natured and hospitable race, fond of song and dance, and skilful weavers of bast mats. The Boston (U.S.) Mission Society have a branch here. These islands were annexed by Germany in 1885. See Hager, *Die Marshallinseln* (Leip. 1886).

Marshalltown, capital of Marshall county, Iowa, near the Iowa River, 50 miles NE. of Des Moines, at the crossing of two railways. It has a large trade in wheat, &c., has foundries and machine-shops, and manufactures flour, oil, soap, and fencing-wire. Pop. (1885) 8298.

Marshalsea, the jail attached to the Marshalsea Court, originally established under the earl-marshal of England for the trial of servants of the royal household. Later on it came to be used as a prison for debtors and defaulters, as well as persons convicted of piracy or other offences on the high seas. It stood near the church of St George, Southwark, and existed in the reign of Edward III. It was abolished as the Palace Court in 1849. Bishop Bonner was confined here for nearly ten years, till his death in 1569, and George Wither in 1613; he obtained his release by his *Satyre to the King's most excellent Majesty*. But the Marshalsea will be longest remembered as the home of Dickens's *Little Dorrit*.

Marsh-gas. See CARBURETTED HYDROGEN.

Marsh-mallow (*Althæa*), a genus of plants of the natural order Malvaceæ. The species, which are not numerous, are annual and perennial plants, with showy flowers, natives of Europe and Asia. Only one, the Common Marsh-mallow (*A. officinalis*), is an undoubted native of Britain, and is common only in the south, growing in meadows and marshes, especially near the sea. The whole plant is wholesome, abounding in fibre, mucilage, starch, and saccharine matter. It is in the roots chiefly that the mucilage abounds. The emollient and demulcent qualities of marsh-mallow are well known in medicine, and in seasons of scarcity the inhabitants of some eastern countries often have recourse to it as a principal article of food. Lozenges made from it (*Pâtes de Guimauve*) are in use. It is said to be palatable when boiled, and afterwards fried with onions and butter. The Hollyhock (q.v.) is commonly referred to this genus.

Common Marsh-mallow (*Althæa officinalis*): *a*, a flower; *b*, fruit.

Marsh-marigold (*Caltha*), a genus of plants of the natural order Ranunculaceæ, having about five petal-like sepals, but no petals; the fruit consists of several spreading, compressed, many-seeded follicles. *C. palustris* is a very common British plant, with kidney-shaped, shining leaves, and large yellow flowers, a principal ornament of wet meadows and the sides of streams in spring. It partakes of the acridity common in the order; but the flower-buds, preserved in vinegar and salt, are said to be a good substitute for capers. It is often called Cowslip in the United States.

Marsh-marigold (*Caltha palustris*).

Marsilio. See FICINO.

Marsivan', a town of Asia Minor, in the vilayet of Sivas, 23 miles NW. of Amasia, with a silver-mine and a pop. of 11,000.

Marston, JAMES WESTLAND, LL.D., dramatic poet, was born at Boston, Lincolnshire, on 30th January 1820. He was articled to his uncle, a London solicitor, but soon gave up law for literature; and in 1842 his *Patrician's Daughter*, a

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blank-verse tragedy of the day, was brought out at Drury Lane by Macready. It was the first, and also the most successful, of more than a dozen plays (*Strathmore, Philip of France,* &c.), all Sheridan-Knowlesian, and all forgotten, though a collective edition of them and his poetic works appeared in 2 volumes in 1876. Besides these, he wrote a novel (1860), a good book on *Our Recent Actors* (1888), and a mass of poetic criticism. Although his house had once been the gathering-place of several of the most prominent literary men in London, Marston died in that city alone (wife, children, grandchildren, all dead before him) on 5th January 1890.—His son, PHILIP BOURKE MARSTON, the blind poet, was born in London, 13th August 1850, and died there on 14th February 1887. His life was a series of losses—of eyesight at three, and afterwards of his sister, his promised bride, and his two dear friends, Oliver Madox Brown and Rossetti. His memory will survive through his friendships—with the last and with Watts and Swinburne—rather than through his sonnets and lyrics. They are exquisite some of them, but too sad for a world that sees. *Songtide, All in All,* and *Wind Voices* were the three volumes of poetry that he published in his lifetime, between 1870 and 1883; to a posthumous collection of his stories is prefixed a memoir by Mr W. Sharp.

Marston, JOHN, dramatist and satirist, a son of John Marston, of Gayton (or Heyton), County Salop, by his wife Maria, daughter of Andrew Guarsi, an Italian surgeon, who had settled in London, was born about 1575, probably at Coventry. He matriculated at Brasenose College, Oxford, 4th February 1591–92, and was admitted B.A. 6th February 1593–94. From the elder Marston's will (dated 24th October 1599) it may be gathered that, after adopting the profession of the law, he abandoned it against his father's wish. He married (but the date of his marriage cannot be fixed) Mary, daughter of Rev. William Wilkes, chaplain to James I. and rector of St Martin's, County Wilts. Ben Jonson wittily observed to Drummond of Hawthornden that 'Marston wrote his father-in-law's preachings, and his father-in-law his comedies,' contrasting the asperity of Marston's comedies with the blandness of the chaplain's sermons. With the exception of *The Insatiate Countess* (which is of doubtful authorship), all Marston's plays were published between 1602 and 1607. He gave up play-writing about 1607, but the date at which he entered the church has not been ascertained. In 1616 he was presented to the living of Christ Church, Hampshire, which he resigned in 1631. He died 25th June 1634 in Aldermanbury parish, London, and was buried beside his father in the Temple Church, 'under the stone which hath written on it *Oblivioni Sacrum.*' His widow was buried by his side, 4th July 1657.

Marston's first work was *The Metamorphosis of Pygmalion's Image: and Certain Satires* (1598). Another series of satires, *The Scourge of Villany,* appeared later in the same year, a second edition (with an additional tenth satire) following in 1599. *Pygmalion,* a somewhat licentious poem, may have owed its inspiration to Shakespeare's *Venus and Adonis.* Marston pretends that it was written with the object of bringing discredit on amatory poetry; but the apology cannot be accepted. Archbishop Whitgift condemned it to the flames with other works of a similar tendency. The satires, which were published under the *nom de plume* of 'William Kinsayder,' are uncouth and obscure. There was a feud between Marston and the satirist Joseph Hall (the future bishop of Norwich), and many hard knocks were dealt on either side. A Cambridge man, one 'W. J.', intervened with his *Whipping of the Satire,* in which he handled Marston roughly; and he was answered, not very effectively, by one of Marston's friends in the anonymous *Whipper of the Satire.* The controversy raged hotly and excited lively interest, but the allusions in these various satirical pieces are not very intelligible to-day.

In September 1599 Henslow records in his *Diary* that he advanced forty shillings to 'Mr Maxtone, the new poete (Mr Mastone),' in part payment for an unnamed play. This 'new poete' was Marston; but there is no other mention of him in the *Diary.* Two gloomy and ill-constructed tragedies, *Antonio and Mellida* and *Antonio's Revenge,* were entered in the Stationers' Register, 24th October 1601, and were published in the following year. They contain passages of striking power, and a deal of intolerable fustian. In 1604 was published *The Malcontent,* a second edition, augmented by Webster, appearing in the same year. It is more skilfully constructed than the two parts of *Antonio and Mellida.* Marston's command of bold and vivid imagery is effectively displayed in the description of the hermit's cell, iv. 2. He dedicated *The Malcontent* in very cordial terms to Ben Jonson, and in 1605 prefixed some complimentary verses to *Sejanus.* There seem to have been many quarrels and reconciliations between Jonson and Marston. Jonson told Drummond that 'he had many quarrels with Marston, beat him and took his pistol from him, wrote his *Poetaster* on him; the beginning of them were that Marston represented him on the stage in his youth given to venery.' The original quarrel began in or about 1598.

The Dutch Courtezan (1605) is full of life and spirit, the character of the vengeful courtesan Franceschina being drawn with masterly ability. *Eastward Ho* (1605), from which Hogarth is said to have taken the plan of his prints 'The Industrious and Idle Prentices,' was written in conjunction with Chapman and Jonson. It is far more genial than any comedy which Marston wrote single-handed. Some satirical reflections on the Scots were introduced, for which offence the authors were committed to prison at the instance of Sir James Murray, and the report went that their ears were to be cut and their noses slit. *Parasitaster, or the Fawn* (1606), in spite of occasional tediousness, is an attractive comedy; but the tragedy of *Sophonisba* (1606) appals us with its horrors, the description of the witch Erichtho and her cave being gruesome to the last degree. *What You Will,* published in 1607, but probably written some years earlier, has many flings at Ben Jonson. *The Insatiate Countess* was published in 1613 with Marston's name on the title-page, but in a copy (belonging to the Duke of Devonshire) of the 1631 edition the author's name is given as William Barksteed, a poet of some ability and an actor. The rich and graceful poetry scattered through *The Insatiate Countess* is unlike anything that we find in Marston's undoubted works. Probably Marston left the play unfinished when he entered the church, and Barksteed took it in hand. An indifferent anonymous comedy, *Jack Drum's Entertainment,* written about 1600, may be safely assigned to Marston from internal evidence; and he appears to have had some share in another poor play, *Histriomastix.* In 1633 William Sheares, the publisher, issued 1 vol. sm. 8vo, *The Works of Mr John Marston,* comprising the two parts of *Antonio and Mellida, Sophonisba, What You Will, The Fawn,* and *The Dutch Courtezan.* Marston's works were edited by the late Mr Halliwell-Phillipps (then Mr Halliwell) in 1856, 3 vols., and by the present writer in 1887, 3 vols.

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Marston Moor, in the West Riding of Yorkshire, 7 miles W. of York, the scene of a great parliamentary victory, 2d July 1644. The royalist army, about 22,000 strong, was led by Prince Rupert; the parliamentary troops numbered 15,000 foot and 9000 horse, consisting of a Scotch army under the Earl of Leven, a Yorkshire army under Fairfax, and one from the eastern counties under the Earl of Manchester, with Cromwell and Crawford. The battle began about seven o'clock in the evening. On the king's left flank the horse under Goring scattered the forces of Fairfax; on his right the troopers of the fiery Rupert were broken for the first time by Cromwell's 'Ironsides.' Hastily recalling his men from the chase, Cromwell saved the day by supporting Manchester and the Scotch infantry against the king's foot under Newcastle, and routing Goring's horse flushed with their victory. Before nightfall the success was complete, and the king's army fled in utter rout to York, leaving 4000 men dead on the field; among them all Newcastle's 'Whitecoats.' This victory gave the whole north to the Parliament, and first brought into prominence Cromwell's military genius. See S. R. Gardiner's *History of the Civil War* (1886), and Edward Lamplough's *Yorkshire Battles* (1891).

Marsupials, lit. 'pouched animals' (*Marsupialia, Didelphia,* or *Metatheria*), a sub-class of mammals, the members of which, with the exception of the American opossums, are now restricted to the Australian and Austro-Malayan regions. They are in many ways simpler than the higher mammals, notably in the structure of the brain and in the absence of a close connection between the unborn young and the womb of the mother. The young are born very helpless, after a short gestation, and are usually stowed away in an external pouch or *marsupium*, where they are fed from the enclosed teats. From the wide occurrence of fragmentary marsupial remains in Triassic and Jurassic strata both in the Old and the New World, it seems that the pouch-bearers have been once widely distributed. Before the stronger mammals which rose up after them they have, however, succumbed, except in the case of the above-mentioned refugees in neo-tropical forests, and those saved by the insulation of the Australasian regions before any higher mammals gained a foothold. In the retreat thus afforded the marsupials have developed along numerous lines, as it were prophesying the carnivores, insectivores, rodents, and herbivores among the placental mammalia. Thus, apart from the carnivorous and insectivorous American opossums (Didelphyidæ), of which one is strictly North American and the rest neo-tropical, there are five Australasian families: the Dasyuridæ or 'native cats,' carnivorous and insectivorous marsupials as large as wolves and as small as mice, of which very pronounced types are the Tasmanian 'tiger' (*Thylacinus*) and the native ant-eater (*Myrmecobius*); the rodent-like Peramelidæ or bandicoots; the herbivorous kangaroos and kangaroo-rats (*Macropodidæ*); the very varied family of arboreal Phalangers (*Phalangistidæ*), including the flying opossums (*Petaurista,* &c.), the native sloth or koala, the honey-sucking Tarsipes, and other curious forms; and finally the Phascolomyidæ or wombats, rodent-like root-eating forms about the size of badgers.

See MAMMALS; also the well-known works of Owen, Huxley, and others on Vertebrates; the relevant parts of Cassell's and the *Standard Natural History;* Chisholm's trans. of Vogt and Specht's *Mammals* (1887); Waterhouse, *Natural History of Mammalia,* i. (1846); and Gould's *Mammals of Australia* (3 vols. 1845–63).

Marsyas, a Phrygian satyr, who, having found a flute that played of itself, which Athena had thrown away, was rash enough to challenge Apollo to a musical contest, subject to the condition that the victor should do what he liked to the vanquished. Apollo played upon the cithara, Marsyas upon the flute, and the Muses decided in favour of the god, who punished his rival's temerity by binding him to a tree and flaying him alive. From his blood sprung the river Marsyas; his statue stood in many ancient cities, a monument of the folly of presumption.

Martaban, a town in Burma, on the right bank of the Salween, opposite to Maulmain (Moulmein). It is reputed to have been built in 576 by the first king of Pegu, and was down to the end of the first quarter of the 14th century the capital of the kingdom. It was taken by the king of Siam two centuries and a half later, and has been twice captured by the British, in 1824 and in 1852. Pop. 1781. The Bay of Martaban receives the rivers Irawadi and Salween.

Martel, CHARLES. See CHARLES MARTEL.

Martello Towers are round towers for coast defence, about 40 feet high, built most solidly, and situated on the beach. They were so called because at Mortella Point in Corsica a small round tower stood admirably an immense cannonade from an English fleet under Lord Hood in 1794. They were mostly erected at the end of the 18th century as a defence against French invasion, and are now regarded as obsolete.

Marten (*Mustela*), a genus of digitigrade carnivorous quadrupeds of the family Mustelidæ, differing from weasels in having an additional false molar on each side above and below, a small tubercle on the inner side of the lower carnivorous cheek-teeth, and the tongue not rough—characters which are regarded as indicating a somewhat less extreme carnivorous propensity. The body is elongated and supple, as in weasels, the legs short, and the toes separate, with sharp long claws; the palms and soles are generally, but not always, furry. The ears are larger than in weasels, and the tail is bushy. The martens exhibit great agility and gracefulness in their movements, and are very expert in climbing trees, among which they generally live. There are nine or ten species in this genus, which are distributed over Europe, Asia,

The Pine Marten (*Mustela martes*).

Malaya, and North America. The American 'Pekan' (*M. pennanti*) is the largest species, measuring as much as 46 inches from the snout to the tip of the tail. The most valuable species of marten is the European Sable (*M. zibellina*). Two species of marten, closely resembling one another, occur in Great Britain—the Common or Beech Marten (*M. foina*) and the Pine Marten (*M. martes*). They are often hunted with foxhounds; for this and other reasons they are getting much less plentiful, though still to be frequently met with in certain localities.

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Martensen, HANS LASSEN, metropolitan bishop of Denmark and her most prominent theologian in the 19th century, was born at Flensborg on 19th August 1808, and studied at the university of Copenhagen. After shaking off the influence of Grundtvigianism, by which he was dominated in his student days, he stepped into the chair of Philosophy at Copenhagen, and in 1845 added to these duties those of court preacher. In 1840 he published a valuable monograph on *Meister Eckhart*, the German mystic, and nine years later laid the foundation of a European fame by a masterly work, from the conservative Lutheran standpoint, on *Christian Dogmatics* (Eng. trans. 1866). This gained him in 1854 the primacy of Denmark, and this again was the cause of a powerful satirical attack upon him by Kierkegaard, which started a controversy in which Martensen suffered severely. His great intellectual energy, however, and the force of his character soon enabled him to recover from the blow, so that, after the publication of another great work, in 3 vols., on *Christian Ethics* (1871–78; Eng. trans. 1881–82), his influence in the country was more dominant than ever. With a mind wonderfully acute and powerful, he was deficient in intellectual sympathy. Nevertheless he stood for many years a bulwark of defence to conservative theology. He died on 3d February 1884. See his *Autobiography*, in Danish (1883), *London Quarterly* (1883), and *Brit. and Foreign Evang. Review*, vol. xxxv.

Martha's Vineyard, an island on the south coast of Massachusetts, 21 miles long, 6 miles in average width. It is noted as a summer health-resort.

Martial. Marcus Valerius Martialis, one of the finest among the few original Latin poets, and still the first of epigrammatists in verse, was born 1st March 38 or 41 A.D., in Celtiberian Spain, at Bilbilis, famed as a steel factory, for which its iron-mines and ice-cold Salo torrent specially fitted it—a centre, too, of Roman culture, which afforded him the good education he got under the eye of his parents, Fronto and Flaccilla. Like other gifted young provincials, he repaired to Rome, where (64 A.D.) he became a client of the influential Spanish house of the Senecas, through which he found other patrons, among them L. Calpurnius Piso, the leading man of his day. The tragic failure of the Pisonian plot lost Martial his warmest friends—Lucan, and still more Seneca, from whose heirs, however, he doubtless derived the small wine-growing estate at Nomentum. Of his life till Domitian became emperor we know little, except that he never maintained himself by the steady professional work to which his compatriot Quintilian seems to have exhorted him, but rather courted imperial and senatorial patronage by his rare social gifts and his genius for *vers de circonstance*. When (80 A.D.) Titus, by a series of gladiatorial spectacles, dedicated the Colosseum to the amusement of Rome, Martial signalised the occasion by epigrams which brought him the *jus trium liberorum* and the equestrian rank—probably proposed by Titus, and afterwards confirmed by Domitian. Substantial independence, however, he did not obtain from either emperor, though his venal flattery of Domitian and of that despot's corrupt retinue was gross enough to leave a stain on his memory. In request as a diner-out, he divided his day between the baths, the theatres, the recitation-halls, and the composition of epigrams, and so far saw his ambition gratified as to count the most distinguished senators of the time among his friends, and all the *literati* in city or province among his readers. Of envy and detraction he had, of course, his share; but what he most complained of was not, for instance, the jealousy of Statius, his young Neapolitan competitor for imperial favour, but the use of his name by malignant poetasters, who fathered on him their own libels on the leaders, including the ladies, of society. His life, indeed, was not a happy one—continually shadowed by that 'ignoble melancholy which arises from pecuniary embarrassment,' so that we find him importuning a patron even for a toga or a mantle. From 86 to 90 he had a lodging, three stories high, at the sign of the 'Pear' on the Quirinal, and in 94 a house of his own in the same quarter; while his Nomentan *pied-à-terre*, which, under better husbandry, might have yielded a living, was prized by him mainly as a retreat from the bores (or duns) of the city. During his thirty-four years of Roman life he seems to have made an excursion from it only once (in 87)—to Forum Corneli and other resorts in the Æmilia. But, by degrees, the capital, its cares and its pleasures, became irksome to him; advancing years bereft him of Domitian and his friends of the palace; and the austere Nerva and Trajan had to be conciliated by other and less congenial arts than the adulatory epigram. In a fit of nostalgia he borrowed from his admirer, the younger Pliny, the means of revisiting those haunts of childhood he had never forgotten—Bilbilis on the mountain-side overhanging the headlong Salo, the snowy peaks of the Sierras, the golden Tagus, the rich orchards, the awe-inspiring oak-forests—his home, with its frugal meals and simple joys. Here again his good genius found him patrons—among them the highly-cultured Marcella, who presented him with an estate, on which, with its grove, its fountain, its vineyard and rosary, its kitchen-garden, its fish-pond and dovecot, he led an idyllic life. But the *vita municipalis* palled on him once more, and even in such surroundings we find him fretting for the *vita urbana* and angling for patrons in that distant world of theatres and libraries, cultured connoisseurs, and social dissipation he was never again to see. Baulked of his wish to attain his seventy-fifth year, he died, at latest, in 104, aged sixty-three or sixty-six.

Martial possessed, for good and evil, the artistic temperament, its lack of steady purpose, its love of hand-to-mouth independence. This latter he enjoyed by humouring the contemporary vices he could not reform, though, conscience-stricken, he excuses himself on the ground that if his 'page were wanton, his life was honest.' Much of his best work, unfortunately, is his least pure, and this has produced an exaggerated impression of his moral turpitude. If, however, we excise 150 epigrams from the 1172 of the first twelve books, his collective writings (including his early 'spectacular' epigrams and his *Xenia* and *Apophoreta*) are free from licentiousness. On the other hand, his genius and skill in verse it were hard to overestimate. An *improvisatore* in readiness, he could attain to the most fastidious finish; with his love of antithetic shocks and electric surprises, he had the true poet's eye for nature; he could alternate the organ-note of a masterful eloquence with minor tones of the most tremulous pathos—witness his epigrams on 'Arria and Pætus,' on 'Pompeii,' on his little slave-girl 'Erotion,' and on 'Formiæ' with its lovely seaboard. But it is as an epigrammatist, even in its modern and restricted sense, that he remains without a peer, wielding a weapon peculiarly his own, bright and pointed as a rapier from the anvils of his native Bilbilis, chastened in the rushing Salo. Unequal, of course, he often is, but never vulgar—rarely (it has been well observed) with all his sense of the ridiculous degenerating into caricature. He lifts the veil from the Rome of Domitian and exposes it mainly on its seamy

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side, with a Hogarthian vividness not outdone by Juvenal himself.

Martial has had to wait long for an adequate commentator, and has found him in the author of the *Stittengeschichte Roms*, Ludwig Friedländer, who alone combined the critical power and the archæological knowledge necessary for the task. The same writer's *M. Valerii Martialis Epigrammaton Libri mit erklärenden Anmerkungen* (2 vols. Leip. 1886) furnishes the student of Martial with every help available—the editor's own work reinforced by that of the best of his predecessors and contemporaries, including the illustrious Cambridge scholar, Munro, to whom the edition appropriately is dedicated.

Martial Law is the exercise of arbitrary power by the supreme authority in a district or country where the ordinary administration has ceased to be operative, either on account of civil disturbance or because of the presence therein of a hostile force, though, in the latter case, the country would be more correctly described as being governed by the 'Laws of War.' Martial law was formerly synonymous with military law, and is often still confounded with it, perhaps because in the above-mentioned circumstances the supreme authority often avails himself of courts-martial and of the troops under his command to maintain order. Military Law (q.v.) is the law contained in the Army Act of 1881, which governs the soldier at all times, but affects civilians only when accompanying a force on active service; while martial law has been defined as 'no law,' but simply the will of the supreme authority. It is not recognised by British jurisprudence, and no rules are laid down for its application. It is assumed that, when the ordinary civil tribunals fail, the supreme authority will do his best to maintain order. He may therefore, if he thinks right, announce his intention of treating the civil population as though under military law, or in any other way that commends itself to him; but if they are British subjects he will have afterwards to justify his action by showing that it was absolutely necessary, and so obtain an indemnity from parliament for conduct which is in itself illegal. Military tribunals have several times been given power by Act of Parliament to try offenders against the public peace in Ireland, as in 1798, but the proclamations on these occasions merely justified the use of arms against rebellious subjects, not against peaceable citizens. They were announcements of the existence of a state of things in which force would be used against wrong-doers for the protection of the public peace, and were always followed by Acts of Indemnity.

On the Continent the practice is different, and when necessary a 'state of siege' is proclaimed in the disturbed district or occupied territory, and the inhabitants are thereby brought to a certain extent under military law.

Martigny, or MARTINACH (the *Octodurus* of the Romans), three united hamlets in the Swiss canton of Valais, is situated on the Simplon railway, 24 miles SE. of the Lake of Geneva. Two noted routes, one to the vale of Chamouni by the Tête Noire or the Col de Balme, the other over the Great St Bernard to Aosta, branch off here. Pop. 4417.

Martignes, a town in the French department of Bouches-du-Rhône, is situated on several islands, united by bridges, at the entrance to the Etang de Berre, 20 miles NW. of Marseilles. From its position, it has been called the Provençal Venice. Pop. 4783, chiefly engaged in catching and curing fish and in shipbuilding.

Martin. See SWALLOW.

Martin, the name of five popes, of whom the fourth and fifth deserve a brief notice.—MARTIN IV., a native of Brie in Touraine, was born about 1210, made cardinal in 1261, and elected pope in 1281. He was a mere tool of Charles of Anjou, and degraded himself even by employing the weapons of spiritual censure in his behalf. But all his efforts to buttress the French power in Sicily proved futile, and three years after the atrocity of the Sicilian Vespers he died, 1285.—MARTIN V. must be noticed as the pontiff in whose election was finally extinguished the great Western Schism (see ANTIPOPE, CHURCH HISTORY). He was originally named Otto di Colonna, of the great Roman family of that name. On the deposition of John XXIII., and the two rival popes Gregory XII. and Benedict XIII., in the Council of Constance, Cardinal Colonna was elected (1417). He presided in all the subsequent sessions of the council, and the fathers having separated without discussing the questions of reform, at that period earnestly called for in the church, Martin undertook to call a new council for the purpose. It was summoned to meet at Siena, and ultimately assembled at Basel in 1431, but the pope died suddenly just after its opening.

Martin, ST, Bishop of Tours, was born at Sabaria in Pannonia about the year 316. He was educated at Pavia, and at the desire of his father, who was a military tribune, entered the army, first under Constantine, and afterwards under Julian the Apostate. The virtues of his life as a soldier are the theme of more than one interesting legend. On obtaining his discharge from military service, Martin became a disciple of Hilary of Poitiers. He returned to his native Pannonia, and converted his mother to Christianity, but he himself endured much persecution from the Arian party, who were at that time dominant; and in consequence of the firmness of his orthodoxy, he is the first confessor, rather than martyr, honoured in the Latin Church with an office and a feast. On his return to Gaul about 360 he founded a convent of monks near Poitiers, where he himself led a life of great austerity and seclusion; but in 371 he was drawn by force from his retreat, and made Bishop of Tours. The fame of his sanctity, and his repute as a worker of miracles, attracted crowds of visitants from all parts of Gaul; and in order to avoid the distraction of their importunity, he established the monastery of Marmoutier near Tours, in which he himself resided. He died between 397 and 401, and St Ninian, who had visited him at Tours and ever preserved the greatest veneration for him, dedicated to his memory the church he was then building at Whithorn in Galloway. His life by his contemporary, Sulpicius Severus, is a very curious specimen of the Christian literature of the age, and in the profusion of miraculous legends with which it abounds might take its place among the lives of the medieval or modern Roman Church. The only extant literary relic of Martin is a short *Confession of Faith on the Holy Trinity*, which is published by Galland, vol. vii. 559. In the Roman Catholic Church the festival of his birth is celebrated on the 11th November. In Scotland this day still marks the winter-term, which is called *Martinmas*. Formerly people used to begin St Martin's Day with feasting and drinking; hence the French expressions *martiner* and *faire la St Martin*, 'to feast,' and the fact that St Martin is the patron of drinking and of reformed drunkards. See the books by Reinkens (Gera, 3d ed. 1876), Chamard (Poitiers, 1873), and Cazenove's *St Hilary and St Martin* in 'Fathers for English Readers' (1883).

Martin, BON LOUIS HENRI, a great French historian, was born at St-Quentin, 20th February 1810, and educated for a notary, but already at twenty had determined for a literary career. His first book was an historical romance, *Wolfthurm*

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(1830), followed by three others treating of the period of the Fronde. He next joined Paul Lacroix, the 'Bibliophile Jacob,' in his vast project for a history of France in 48 volumes, consisting of extracts from histories and chronicles from the earliest period to 1830. He published the first volume in 1833, and henceforward toiled alone at the vast undertaking, which was completed on a smaller scale in 1836. He now set himself to a still more gigantic task, his great *Histoire de France* (15 vols. 1833–36). A third and much improved edition (19 vols. 1837–54) earned the Gobert prize; the fourth edition (17 vols. 1855–60) was awarded by the Institute in 1869 the great prize of 20,000 francs. This magnificent work comes down only to 1789; its continuation to the author's own time formed the less admirable *Histoire de France Moderne* (2d ed. 5 vols. 1878–85). Martin acted for a time as maire of one of the arrondissements of Paris; and was chosen deputy for Aisne in 1871, senator in 1876. He was elected a member of the French Academy in 1878. He wrote several minor histories, such as the *Histoire de Soissons* (1837), *Daniel Manin* (1859), *Jeanne d'Arc* (1872); and died at Paris, 14th December 1883. Martin was the last of the giants of French history influenced by Augustin Thierry, who aimed at comprehending the whole field within their range of study. As sensitive to the romantic as Michelet, he kept his imagination in check by the weight of his learning, the solidity of his sense, and by due respect to documents. Only in his treatment of the earlier period did he give free play to his fancy in his reconstruction of a history of Gaul, in which Druidism was discovered to be a sublime religion, with Merlin as its prophet, and medieval chivalry but its legitimate outcome. Yet his study of Celtic antiquities contains much that will remain of the highest value. The whole work reveals impartiality and insight, is excellently arranged, and admirably written—the work of a true patriot, and if a Chauvinist, a Chauvinist of genius. It is beyond doubt the best work dealing in detail with the history of France as a whole.

See the Life by Hanotaux (1885), Mulot's *Souvenirs Intimes* (1885), and Jules Simon's *Mignet, Michelet, Henri Martin* (1889).

Martin, JOHN, painter, was born at Haydon Bridge, near Hexham, Northumberland, 19th July 1789. In 1806 he went up to London, in 1808 married, and, after a struggling youth as an heraldic and enamel painter, in 1812 exhibited 'Sadak in search of the Waters of Oblivion' at the Royal Academy, with which body he soon afterwards quarrelled. It was the first of his sixteen 'sublime' works, whose 'immeasurable spaces, innumerable multitudes, and gorgeous prodigies of architecture and landscape' divided the suffrage of the many between Martin and Turner; Bulwer-Lytton indeed pronounced him 'more original, more self-dependent' than Raphael and Michael Angelo! Even yet their memory is kept lurid by the coloured engravings of the 'Fall of Babylon' (1819), 'Belshazzar's Feast' (1821), 'The Deluge' (1826), &c. For twenty-seven years Martin had also been busied with projects for the improvement of London, and for four had been working on four pictures illustrative of the 'Last Judgment,' when he died at Douglas, in the Isle of Man, 17th February 1854.

Martin, SIR THEODORE, born in Edinburgh in 1816, was educated there at the High School and university, and in 1846 settling in London, became a prosperous parliamentary solicitor. Among his earliest writings were the well-known 'Bon Gaultier' ballads, written in conjunction with Professor Aytoun. This was followed by translations of Goethe's *Poems and Ballads*, Henrik Hertz's *King René's Daughter*, and Oehlenschläger's *Correggio* and *Aladdin or the Wonderful Lamp*. Further metrical translations were of Horace's *Odes* (1860), of his whole works (1882), Catullus (1861), the *Vita Nuova* of Dante (1862), *Faust*, part i. and ii. (1865–86), and Heine's *Poems and Ballads* (1878). In 1863 he issued a volume of original and translated poems, and in 1870 an admirable little book on Horace in the 'Ancient Classics for English Readers.' In 1875 he was made C.B., in 1880 K.C.B., and in November of that year was elected Lord Rector of St Andrews University. He has written a series of biographies of Aytoun (1867), the Prince Consort (5 vols. 1874–80), Lord Lyndhurst (1883), and the Princess Alice (1885).

LADY MARTIN, well known as an actress by her maiden name, Helen Faucit, was born 11th October 1820, and made her professional début as Julia in the *Hunchback* at Covent Garden in January 1836. She was at once successful, took a leading part in Macready's Shakespearian revivals, in the first representation of Lytton's plays, and in Browning's *Blot in the Scutcheon* and *Strafford*. As an interpreter of Shakespeare's heroines, Juliet, Rosalind, Portia, Beatrice, Imogen, Cordelia, and Lady Macbeth, she stood first among the actresses of her time. After her marriage to Theodore Martin in 1851 she left the stage, appearing only at rare intervals for public or charitable purposes, as in Beatrice at the opening of the Shakespeare Memorial Theatre at Stratford. In 1885 she published a volume of delightful studies entitled, *On Some of Shakespeare's Female Characters* (Ophelia, Portia, Desdemona, Juliet, Imogen, Rosalind, and Beatrice).

Martina, a town of Southern Italy, half-way between Taranto and Monopoli. Pop. 14,454.

Martineau, HARRIET, born at Norwich, 12th June 1802, was the daughter of Thomas Martineau, a Norwich manufacturer. She received a good classical education, and worked diligently and conscientiously, but did not in her school-days show promise of anything remarkable. Increasing deafness and constant ill-health made her often anxious and unhappy as a girl, uncertain in temper, and silent in habit. Her first appearance in print was in 1821, when she wrote an article for the *Monthly Repository*, a religious periodical. In the next few years she wrote *Devotional Exercises*, articles for the *Monthly Repository*, and short stories about machinery and wages. In 1829 the failure of the house in which she, and her mother and sisters, had placed their money obliged her to earn her living. In 1830 she wrote *Traditions of Palestine*, and gained three prizes for three *Theological Essays* for the Unitarian Association. In 1831 she resolved to bring out a series of stories as *Illustrations of Political Economy*, knowing that the work was wanted. Notwithstanding repeated refusals and discouragements from publishers, she persevered in her plan, and in 1832 the first number appeared. A fortnight after publication the demand for this number reached five thousand, and from that day the way was open to her for life, and she never had any other anxiety about employment than what to choose, nor any real care about money. Her popularity was extraordinary during the appearance of *Illustrations of Political Economy*. She removed to London in 1832, the better to carry on her work. In 1834 she went to America for two years, and soon after her return published *Society in America* and a novel, *Deerbrook*, in 1839. She went abroad the same year, returned ill, and settled at Tynemouth, where she remained, a complete invalid, till 1844. During her illness she wrote *The Hour and the*

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Man, four volumes of children's tales, and *Life in the Sick-room*. She recovered through mesmerism, left Tynemouth, and fixed her abode in the Lake Country, where in 1845 she built herself a house in Ambleside. The same year she published *Forest and Game-law Tales*. In 1846 she visited Egypt and Palestine, and on her return issued *Eastern Life*. In 1849 she completed Knight's *History of the Thirty Years' Peace;* in 1851, in conjunction with Mr H. G. Atkinson, she published a series of *Letters on the Laws of Man's Social Nature and Development;* and in 1853 she translated and condensed Comte's *Philosophie Positive*. She also wrote *Household Education*, *Biographical Sketches*, and contributed largely to the daily and weekly press and the larger reviews. She died 27th June 1876, and was buried at Birmingham. Her *Autobiography*, written and printed many years before, was published with an editorial volume in 1877.

Harriet Martineau was brought up as a Unitarian, and describes herself when a girl as 'sincerely and heartily religious.' Her views gradually changed, and she became an Agnostic. She was a vigorous thinker, seeing clearly and saying clearly what she had to say. Her sympathy, kindness of heart, integrity of mind, and impartiality of judgment won esteem and affection for her, even from those who did not share her opinions, and few literary women have in their time enjoyed more fame than she did.

Martineau, JAMES, theologian, brother of the preceding, was born at Norwich, 21st April 1805. He was educated at the grammar-school of his native city, and under Dr Lant Carpenter at Bristol, and had already been a Unitarian minister at Dublin and Liverpool, when in 1841 he was appointed professor of Mental and Moral Philosophy at Manchester New College. He removed to London when that institution was transferred thither in 1857, becoming also one of the pastors in Little Portland Street Chapel. He became principal of the college in 1868, and held the office till his retirement in 1885. Martineau was recognised for fifty years as one of the profoundest thinkers and most effective writers of his day. Earnest and lofty in his aims, and catholic in his sympathies, he unites strong grasp of thought and power of subtle analysis to a rare mastery of English style. Indeed in the power of elucidating the most abstract thought he has seldom been surpassed, and he is no less learned than original. Martineau received the degree of LL.D. from Harvard in 1872, Doctor in Theology from Leyden in 1875, and D.D. from Edinburgh in 1884. He was one of the founders of the *National Review* (1855-64), and was a frequent contributor to its pages.

His principal works are *The Rationale of Religious Inquiry* (1836); *Hymns for the Christian Church and Home* (1840); *Endeavours after the Christian Life* (2 vols. 1843-47); *Miscellanies* (1852); *Studies of Christianity* (1858); *Essays, Philosophical and Theological* (2 vols. 1868); *Hymns of Praise and Prayer* (1874); *Hours of Thought on Sacred Things* (2 vols. 1876-80); *A Study of Spinoza* (1882); *Types of Ethical Theory* (2 vols. 1885); *A Study of Religion: its Sources and Contents* (2 vols. 1888); *The Seat of Authority in Religion* (1890); and *Studies, Reviews, and Addresses* (1891).

Martinet, a French general of the time of Louvois (q.v.).

Martinique, called by the natives Madiana, is one of the Lesser Antilles, in the West India Islands. It is 43 miles long by 12 to 20 broad, and has an area of 380 sq. m., and (1888) 175,391 inhabitants, of whom only 10,000 are whites. The island was discovered by the Spaniards in 1493, colonised by the French in 1635, and except for three short intervals (1761-63, 1794-1802, 1809-14), when it was held by the British, it has been a French colony ever since. A mountain-knot in the north (4430 feet) and another in the south are connected by a low ridge, all being densely covered with trees. There are numerous short streams. The coasts are irregular and high, except on the west, where stand St Pierre (pop. 20,000), the principal commercial place, and Fort de France (15,000), the capital, which was nearly destroyed by fire in 1890. The climate is moist and hot (annual mean 79° F.), and yellow fever is a not unfrequent visitor. The soil is very productive. About one-half of the land in cultivation is occupied with sugar-cane the staple crop. Of the other half about 75 per cent. is planted with manioc, sweet potatoes, bananas, and other food plants, whilst coffee, cocoa, and tobacco are each cultivated to a small extent. There is also considerable grazing of cattle, sheep, and goats. The exports (sugar, molasses, and rum mostly) average nearly £850,000 annually; the imports (textiles, flour, fish, rice, and cotton, &c.) about £955,000. Slavery was abolished in 1848; labour is largely performed by coolies (27,000). Railways connect the principal towns. See works in French by Pardon (1877), Huc (1877), Rey (1881), Aube (1882), and Basset (1886).

Martinmas, in Scotland, is one of the four term-days for paying rent—viz. 11th November.

Martinsburg, capital of Berkeley county, West Virginia, in the Shenandoah Valley, 114 miles by rail W. of Baltimore, contains a large distillery, several mills and factories, and extensive railway-shops. Pop. 6335.

Martin's Ferry, a town of Ohio, on the Ohio River, 89 miles by rail SW. of Pittsburg, contains iron-works, &c., and very large glass-works. Pop. (1890) 6247.

Martius, CARL FRIEDRICH PHILIPP VON, traveller and naturalist, was born on 17th April 1794, at Erlangen, and studied medicine there. In 1817-20 he went to Brazil as member of a scientific expedition sent out by the Austrian and Bavarian governments, and by his researches in that country acquired a reputation which ranked but little inferior to that of Humboldt. This reputation was chiefly established by the books he published after his return—one on the journey (3 vols. 1824-31), several on the cryptogams, palms, and other plants of Brazil, on the medicine of the Indians, and on the ethnology and languages of that region, besides other botanical works. He was professor of Botany (1826-64) and Director of the Botanic Garden (1832-64) at Munich, and died in that city on 13th December 1868.

Martius' Yellow. See DYEING.

Martos, a town of Andalusia, Spain, 16 miles SW. of Jaen, on a steep hill crowned by an old castle. Pop. 14,654.

Martyn, HENRY, a missionary-martyr, was born at Truro, February 18, 1781, and educated at Truro grammar-school and St John's College, Cambridge. He was senior wrangler and first Smith's prizeman in 1801, and next year became Fellow of his college. At first he meant to study law, but the influence of Charles Simeon, acting on his own enthusiastic temperament, determined him for a missionary. After taking orders he served some time as Simeon's curate, but in 1805 sailed for India as a chaplain under the Company. He was stationed successively near Serampore, at Dinapore, and at Cawnpore, and from the beginning gave himself to the study of the native languages with an eager zeal that surmounted even his greatest difficulty—broken health. He translated the whole New Testament into Hindustani, Hindi, and Persian, as well as the Prayer-book into Hindustani and

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the Psalms into Persian; and next, his ardour rising as the sands of his time ran swiftly out, sailed to Bushire, travelled thence to Shiraz, Tabriz, Erivan, Kars, Erzeroum, and Tokat, where he sank exhausted by fever, 6th October 1812. His Life was written by Sargent (1819; new ed. 1885), and by Wilberforce (1837).

Martyr (Gr. *martus*, *martur*, 'a witness'), the name given in ecclesiastical history to those who, by their fearless profession of Christian truth, and especially by their fortitude in submitting to death itself rather than abandon their faith, bore the 'witness' of their blood to its superhuman origin. Of the same use of the word there are some examples also in the New Testament, as in Acts, xxii. 20; Rev. ii. 13; xvii. 6. But this meaning, as its technical and established signification, is derived mainly from ecclesiastical writers. During the persecutions of the Christians in the first three centuries (see CHURCH HISTORY), contemporary writers, as well pagan as Christian, record that many Christians, preferring death to apostasy, became martyrs or witnesses in blood to the faith, often in circumstances of the utmost heroism. The courage and constancy of the sufferers won the highest admiration from the brethren. It was held a special privilege to receive the martyr's benediction, to kiss his chains, to visit him in prison, or to converse with him; and a practice arose by which the martyrs gave to sinners who were undergoing a course of public penance letters of commendation to their bishop (see INDULGENCE). The day of martyrdom, moreover, as being held to be the day of the martyr's entering into eternal life, was called the *natal* or *birth* day, and as such was celebrated with peculiar honour, and with special religious services. Their bodies, clothes, books, and the other objects which they had possessed were honoured as Relics (q.v.), and their tombs were visited for the purpose of asking their intercession (see CANONISATION). Cyprian says of catechumens who died before baptism, that they had been baptised 'with the most glorious baptism of blood;' and the blood-baptism was held to remit sin and the temporal penalty of sin also. The number of martyrs who suffered death during the first ages of Christianity has been a subject of great controversy. The ecclesiastical writers, with the natural pride of partisanship, have, it can hardly be doubted, leaned to the side of exaggeration. Some of their statements are palpably excessive; and Gibbon, in his well-known 16th chapter, throws great doubt even on the most moderate of the computations of the church historians. But it is clearly though briefly shown by Guizot, in his notes on this celebrated chapter, that Gibbon's criticisms are founded on unfair and partial data, and that even the very authorities on which he relies demonstrate the fallaciousness of his conclusions. The first recorded martyr of Christianity, called the 'protomartyr,' was Stephen, whose death is recorded in Acts, vi. and vii. The protomartyr of Britain was Alban of Verulam, who suffered under Diocletian in 286 or 303.

MARTYROLOGY, a list of the commemoration days of Christian martyrs, generally with some account of their life and death, arranged in the order of months and days, and intended partly to be read in the public services of the church, partly for the guidance of the faithful in their devotions. The use of the martyrology is common to both the Latin and the Greek Church; in the latter it is called menology, or 'month-calendar.' Nearly all the later Western martyrologies are based upon one or other of three works, the Hieronymian, the Lesser Roman, and Bede's Martyrology. The first, which was stated to be compiled by St Jerome from records of martyrdoms collected by Eusebius, is itself a compilation from numerous earlier calendars, and contains notices of many facts long subsequent to Jerome's time. A copy of the Lesser Roman Martyrology was discovered at Ravenna by Ado, Archbishop of Vienne, in 850, and seems to have been rather a private historical calendar than one intended for public use. The independent compilation by Bede has come down to us only in later editions, chiefly of the 9th century, as that of Florus of Lyons, Hrabanus Maurus, Ado of Vienne, and Usuard of Paris, as well as that of Notker of St Gall (912). The best-known menology, that compiled by order of the Emperor Basil, the Macedonian, in the 9th century, was edited in 1727 by Cardinal Urbini. In 1866 Professor W. Wright published a Syriac martyrology recently discovered by him, and written in or before 412. The official 'Roman Martyrology,' designed for the entire church, was published by authority of Gregory XIII., with a critical commentary, by Baronius in 1586; an enlarged edition of the same was issued by Rosweyd in 1613.

Martyr, PETER. See PETER.

Marut is, in Hindu Mythology, the god of wind. See INDIA, Vol. VI. p. 104.

Marvell, ANDREW, was born March 31, 1621, at Winestead, in the East Riding of Yorkshire, where his father, who three years later became master of the grammar-school and lecturer at Trinity Church in Hull, was rector of the parish. In his thirteenth year he went to Trinity College, Cambridge, with a Hull exhibition, and in 1639 graduated B.A. In January 1641 he lost his father, drowned in crossing the Humber, 'to the great grief of all good men,' says Fuller, and at the close of the same year his university career came to an end, through non-observance of his 'days and acts.' It was probably after coming of age in 1642 that he set out on his travels. It is said that he met Milton in Rome, and that 'they publicly argued against the superstitions of the Romish Church, even within the verge of the Vatican;' but unfortunately for the legend Milton came home nearly three years before Marvell set out. He was four years abroad, in Holland, France, Italy, and Spain, but there is no sign of his return until 1649, when his name appears to one of the 'Elegies on the Death of Lord Hastings,' and in the *Lucasta* of 'his noble friend Richard Lovelace,' the royalist. His sympathies were still more clearly shown next year in his fierce lines on May, the historian of the Long Parliament. In the summer of 1650 Lord Fairfax engaged Marvell, whose father he no doubt knew, as tutor to his young daughter Mary Fairfax, afterwards Duchess of Buckingham. By him, apparently, Marvell was introduced to Milton, who in February 1653 recommended him to Bradshaw as a good scholar and linguist, and well qualified to act as assistant Latin secretary. Though unsuccessful, the recommendation, it seems, brought him under Cromwell's notice, for in July he was appointed by him tutor to a Mr Dutton, called, unaccountably, Cromwell's nephew. In 1657 he was appointed Milton's assistant, and in January 1659 took his seat in Richard Cromwell's parliament as member for Hull, for which he was returned again in 1660, and again in 1661. In 1663–65 he accompanied Lord Carlisle as secretary to the embassy to Muscovy, Sweden, and Denmark, but the rest of his life was devoted to watching over the interests of his constituents in parliament, resisting the misapplication of the money voted for the defence of the nation, and doing battle, in the House and out of it, with the partisans of intolerance and arbitrary government. He died somewhat suddenly, August 18, 1678. The Popish

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Plot panic had just set in, and, being a marked man, he was supposed to have been made away with by poison. His death, however, was really due to natural causes, an attack of tertian ague and 'the ignorance of an old conceited doctor' (Morton's *Pyretologia*, 1692: *Athenæum*, No. 2419). He was buried in St Giles's-in-the-Fields, 'under ye pewes in ye south side,' according to Aubrey.

Marvell's claims to remembrance are concisely summed up when he is described as 'poet, patriot, and friend of Milton,' but the second is the title by which he is best known. The refusal of a coarse bribe has sent him down to posterity as a prodigy of patriotic virtue, and the fact is as severe a satire on the corruption of his time as anything in his own writings. Attempts have been made to tone down popular admiration in his case, by suggestions, for example, of intemperate habits, founded on a casual remark of Aubrey's, though it is clear from the context that Aubrey meant nothing of the kind; and a stain on his character has been found in the grossness and virulence of the political satires that bear his name. But we should remember that, except in one or two cases, we have no right to assume that he was the author of these things. The *Advice to a Painter* is vouched for by Aubrey, but for the rest we have no better authority than the printer of *Poems on Affairs of State* (1689), a man with a muck-rake scraping together the scurrilities of the two past reigns; and, as he has put the name to two or three pieces Marvell did not write, he may have put it to more. But, even if Marvell did write them, we must recollect that it was a coarse age, and that to be effective he had to use its language and ideas. Because he served under Cromwell and was a friend of Milton, it is often assumed that he was a Roundhead and a republican, but his own words belie the assumption. The royalist fervour of his youth cooled, and he admired Cromwell because he put down anarchy with a strong hand, and 'made England great and his enemies tremble,' but he was no admirer of Cromwell's rule. He was a constitutionalist before all things. In his prose tracts and his letters to his constituents, he makes it clear that if Charles could have kept straight he would have had no sturdier supporter than Andrew Marvell, but even in his despair his attitude is expressed in his own noble line, ''Tis godlike good to save a falling king.' Marvell's works are divided by the Restoration into two very distinct groups. After 1660 his pen was given up to politics, except when his friendship for Milton drew from him the lines prefixed to the second edition of *Paradise Lost*. In 1672-73 he wrote the *Rehearsal Transpros'd* in answer to Parker, afterwards Bishop of Oxford, who had come forward as the advocate of religious intolerance; and in 1676 a similar work, *Mr Smirke, or the Divine in Mode*, in reply to Turner, Master of St John's, Cambridge, to which he added a *Historical Essay on General Councils*. In 1677 his most important tractate, the *Account of the Growth of Popery and Arbitrary Government*, was printed at Amsterdam, the title-page says; in 1678 his defence of the Nonconformist John Howe; and to complete the list his voluminous correspondence with his constituents should be added. His poetry was printed in folio in 1681 with a preface by his widow, which Cooke, the editor of a new edition in 1726, denounced as the work of an impostor, an aspersion disposed of by the letters of administration granted in 1679 to *Mariæ Marvell, relictæ*. As a poet Marvell belongs altogether to the pre-Restoration period. Most of his poems seem to have been written during his residence with Fairfax, and all, clearly, before he entered public life. 'A witty delicacy,' as Lamb called it, and a certain classical turn of expression that betrays the scholar, give a peculiar character to his poetry, but unquestionably his distinguishing characteristic as a poet is his genuine, hearty enjoyment of nature, of which, perhaps, no English poet between Chaucer and Wordsworth had so large a share.

The only complete and accurate edition of Marvell's works is that of Dr Grosart, in 4 vols. 1872-74. The edition by Captain Thompson (3 vols. 4to, 1776) printed for the first time the poems on Cromwell, in one of which occurs the famous passage about the death of Charles I. For Thompson's absurd claim of poems by Addison, Mallet, and Dr Watts, see the *Cornhill Magazine*, July 1869.

Márwár. See JODHPUR.

Marx, KARL, the founder of international socialism, was born at Trèves, 5th May 1818. His father was a lawyer in that town, and the young Marx was sent to the universities of Bonn and Berlin to study with a view to the same profession; but he seems really to have devoted his time to history and philosophy. He was apparently a disciple of Hegel, and he had for a time the intention to settle at Bonn as a lecturer on philosophy. Marx, however, soon gave up the idea of following an academic career, and in 1842 undertook the editorship of the democratic organ, the *Rhenish Gazette*. His experience on the journal convinced him that his economic knowledge required enlarging; and after his marriage he proceeded in 1843 to Paris, the headquarters of revolutionary economics. In the *Deutsch-Französische Jahrbücher* he began that course of literary activity which, varied by agitation, constituted the work of his life. Expelled from France in 1845, he settled in Brussels, where amongst other productions he wrote his attack on Proudhon's *Philosophie de la Misère*, entitled *Misère de la Philosophie*.

But his chief work at Brussels was the reorganising, along with Fr. Engels, of the Communist League, for which he wrote the famous *Manifesto* (see INTERNATIONAL). In 1848 Marx took an active part in the revolutionary movement on the Rhine, and after its failure finally settled in London in 1849. Here at the British Museum he acquired his marvellous knowledge of economic literature and of the economic development of modern Europe. The early fruits of his labour appeared in a work, *Zur Kritik der politischen Oekonomie* (1859), the theories of which were, however, carried forward into the first volume of his *Kapital* (1867). Before that year Marx had, in 1864, resumed his work as agitator. He had the foremost part in founding and directing the International, and after the death of Lassalle he won practical control of the social-democratic movement in Germany. He died in London, 14th March 1883.

Marx's works leave us in no doubt that he was a man of extraordinary knowledge, which he handled with masterly skill. To one who has taken the pains to understand his terminology his style is lucid and powerful, though also sometimes tedious owing to the minuteness of his exposition; and the march of thought is varied by humour, unsparing invective, and flashes of light from the most unexpected quarters. Since the beginning of literature few books have been written like the first volume of Marx's *Kapital*. It is premature to offer any definitive judgment on his work as revolutionary thinker and agitator, because that is still very far from completion. There need, however, be no hesitation in saying that he, incomparably more than any other man, has influenced the labour movement all over the civilised world; his theories have in a thousand ways already penetrated the different strata of society, even the highest, but most of all the working-classes. It

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may also be safely said that his views can have any hope of realisation only after very extensive modification. In many respects his analysis of the economic development of modern society has been justified by subsequent events, but in many also it has been falsified; and it could be shown that he has left out of account some of the decisive factors in social development.

As he tells us in the preface to the *Kapital*, the final aim of his great work is to reveal the economic law that moves modern society. The social development of modern times depends on capital; the cardinal fact in modern history is the rise, culmination, and final catastrophe of capitalism. But the full development of capital and of the class representing it involves the rise of socialism and of the proletariat. The great work of Marx, therefore, gives us an historical analysis of capital and by implication a forecast of socialism.

The development of capitalism depends on the appropriation and accumulation of surplus value; we cannot understand the nature of capitalism without understanding surplus value. With the analysis of value, therefore, the great work of Marx begins. The wealth of modern society, in which the capitalistic method of production prevails, appears as an enormous collection of commodities, which are exchanged one against another in the utmost variety of ways. But they have one common characteristic: they are products of human labour. The value of all the commodities that circulate in the world-market is constituted by human labour, and measured in human labour-time; not this or that individual labour, but the average labour of the community, under the normal social conditions of production, with the average degree of skill and intensity of labour.

But labour cannot be carried on without the means of labour, which are land and capital. Taking England as the classic example of the fully-developed capitalism, Marx shows that since medieval times the course of historic evolution has tended to render the instruments of labour the monopoly of a special class. It is clear that the rise of such a class has had as complement the rise of another class who are destitute of the means of production, but who being free may sell their labour at the wage it can obtain in the market. They accordingly sell their labour for a wage, which represents the average subsistence necessary for themselves and the children required to continue the supply of labour. Their labour, however, when utilised by the capitalist produces a value greater than their wage. This is the *surplus value* of Karl Marx. The growth of capitalism depends on the appropriation and accumulation of this surplus value; and the history of modern society is a history of the antagonism of the two classes concerned—of the capitalist class, who absorb surplus value, and of the proletariat, who produce it.

The progress of the conflict leads to many remarkable results. On the one hand the great capitalist goes on destroying the smaller, until the wealth of the world is concentrated in the hands of a few colossal capitalists. On the other hand the development of the capitalistic system causes degradation, demoralisation, misery, and pauperism among the labouring classes, but it at the same time organises them in industrial armies; above all it raises them to a clear consciousness of their class position. In this way the process goes on in obedience to its own inherent laws, wealth accumulating at one pole of society and wretchedness at the other. Capitalism is at last ruined by an excess of the sustenance on which it grew—viz. surplus value. When things have become intolerable, the organised proletariat take the initiative, and seizing possession of the means of production carry on the economic process for the good of all. Government—which has always hitherto been an arrangement for keeping the producing classes in subjection—will simply become a control of productive processes.

As understood by Marx, socialism does not propound utopian schemes, nor even does it seek particularly to offer programmes of social reform. The great aim of his teaching is to understand a process of historical transformation which proceeds before our eyes; scientific socialism is simply a conscious participation in this process. Agitation and revolutionary action can be effective only in so far as they comprehend and co-operate with the inevitable tendencies of social evolution. The change contemplated by socialism is an economic revolution brought about in accordance with the natural laws of historic evolution. We must also remember that Marx regards the economic factor as cardinal and decisive in history. Law and politics, religion and philosophy, are all moulded and controlled by the prevailing economic conditions. With this view of Marx is naturally associated his materialistic conception of history. 'According to Hegel, the thought-process, which he transforms into an independent subject under the name idea, is the creator of the real, which forms only its external manifestation. With me, on the contrary, the ideal is nothing else than the material transformed and translated in the human brain.' In short, the system of Marx is an evolutionary and revolutionary socialism, based on a materialistic conception of the world and of human history. He seeks to change the economic basis of society, and thereby to change the whole structure, but only by a conscious participation in, and willing co-operation with, historic tendencies, which in themselves are inevitable.

In his later and mature productions so far as published Marx has not given any definite forecast of the form likely to be assumed by the new society, and indeed has expressly disavowed any wish to provide a recipe for social betterment. The responsibility for a development in detail like that made by Schäffle in his *Quintessenz des Sozialismus* rests entirely with the author of that work. As already indicated, Marx's great aim is to elucidate an historical process which is inevitable, to make it clear to the consciousness of the class most profoundly interested—the proletariat, and as far as possible to shorten and alleviate the pangs of travail of the new era, which in any case will come to the birth when its time is fulfilled. Thus regarded, the life and work of Marx have a notable unity and reach and fixity of purpose. All that he did and wrote as scientific economist on the one hand and as agitator on the other, though at first sight inconsistent, is really formed and animated by the one idea.

The leading works of Marx have been mentioned in the foregoing article; a 3d edition of his *Kapital*, vol. i., appeared in 1883; vol. ii. was published under the editorship of Fr. Engels in 1885. Most economic works that have been published during the last twenty years have something to say about Marx, but no adequate exposition and criticism of his system has yet appeared.

Mary (Heb. *Miriam*, Gr. *Maria* or *Miriam*), 'the mother of Jesus' (Matt. ii. 11; Acts, i. 14), called the Blessed Virgin, is the mother of our Lord according to the flesh, held in high honour by all Christians; and her intercession is invoked with a higher religious worship and a firmer confidence than that of all the other saints, not only in the Roman Church, but in all the Christian churches of the East. Of her personal history but few particulars are recorded in Scripture. Some details are filled up from the works of the early

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Fathers, especially their commentaries or deductions from the scriptural narrative, some from the apocryphal writings of the first centuries, and some from medieval or modern legendaries. The genealogy of our Lord in St Matthew is traced through Joseph (q.v.); and, as it is plainly assumed that Mary was of the same family with her husband Joseph, the evidence of the descent of the latter from David is equivalently an evidence of the origin of Mary from the same royal house. But the genealogy of Christ as traced in St Luke is commonly held to be the proper genealogy of his mother in the flesh, Mary. The incidents in her personal history recorded in Scripture are few in number, and almost entirely refer to her relations with our Lord. They will be found in Matt. i., ii., xii.; Luke i., ii.; John ii., xix.; and Acts, i., where the last notice of her is of her 'persevering in prayer' with the disciples and the holy women at Jerusalem after our Lord's ascension (Acts, i. 14). The apocryphal gospels entitled 'The Gospel of the Nativity of Mary,' and the 'Protevangelion of the Birth of Christ,' contain some additional, but, of course, unauthentic particulars as to the lineage, birth, and early years of Mary, among which is the miraculous story of her betrothal with Joseph, immortalised by the pencil of Raphael. As to her history after the ascension of her Son the traditions differ widely. A letter ascribed to the Council of Ephesus speaks of her as having lived with John at that city, where she died, and was buried. Another epistle, nearly contemporaneous, tells that she died and was buried at Jerusalem at the foot of the Mount of Olives. Connected with this tradition is the incident which has so often formed a subject of sacred art, of the apostles coming to her tomb on the third day after her interment, and finding the tomb empty, but exhaling an 'exceeding sweet fragrance.' On this tradition is founded the belief of her having been assumed into heaven, which is celebrated in the festival of the Assumption (q.v.). The date of her death is commonly fixed at the year of our Lord 63, or, according to another account, the year 48. Another tradition makes her survive the crucifixion only 11 years.

Of theological questions regarding the B.V.M. (*Beata Virgo Maria*), one is treated at IMMACULATE CONCEPTION. The perpetual virginity of Mary is not explicitly attested in Scripture, and there are even certain ambiguous phrases which at first sight seem to imply that children were born of her after the birth of Jesus, as that of his being called (Matt. i. 25; Luke, ii. 7) her '*first*-born son,' and that of James and others being more than once called 'brothers of the Lord;' for which see JOSEPH. The perpetual virginity of Mary is held as a firm article of belief in the Roman and Eastern churches.

MARIOLATRY (Gr. *Maria*, and *latreia*, 'adoration') is the name given by polemical writers to the worship paid by Roman Catholics to the Virgin Mary. This name is intended to imply that the Catholic worship of the Virgin is the supreme worship of *latreia* or adoration, which Catholics earnestly disclaim, although, from her relation to our Lord, they hold her worship, which they style *hyperdulia*, to be higher than that of all other saints. Many examples of prayers addressed to Mary (such as the 'Litany of the Sacred Heart of Mary'), of acts of worship done in her honour, and of expressions employed regarding her, are alleged by controversialists, for the purpose of showing that the worship of Mary in the Roman Church is in effect 'adoration.' To these and similar allegations Roman Catholics reply that many of the objected prayers and devotional practices are entirely unauthorised by the church, and that some of them are undoubtedly liable to misinterpretation; but they further insist that all such prayers, however worded, are to be understood, and are, in fact, understood by all Roman Catholics, even ordinarily acquainted with the principles of their faith, solely as petitions for the intercession of Mary, and as expressions of reliance, not on her own power, but on the efficacy of her prayers to her Son.

Although no trace is found in the New Testament of any actual worship of the Virgin Mary, yet Roman Catholic interpreters regard the language of the angel Gabriel, who saluted her as 'full of grace,' or 'highly favoured,' and as 'blessed among women,' and her own prediction in the canticle of the Magnificat, that 'all nations should call her blessed' (Luke, i. 48), as a foreshadowing of the practice of their church; and they rely equally on the language employed by the early Fathers, as, for instance, Irenæus, regarding the Virgin, although Protestants consider it as having reference to the Incarnation. But it seems quite certain that during the first ages the invocation of the Virgin and the other saints must have held a subordinate place in Christian worship; the reason for which, according to Roman Catholics, was probably the fear which was entertained of reintroducing among the recent converts from paganism the polytheistic notions of their former creed. But from the time of the triumph of Christianity in the 4th century, the traces of it become more apparent. St Gregory Nazianzen, in his panegyric of the virgin martyr Justina, tells that in her hour of peril she 'implored Mary the Virgin to come to the aid of a virgin in her danger.' But it was only after the heresy of Nestorius that the worship of Mary seems to have obtained its full development. His denial to her of the character of mother of God, and the solemn affirmation of that character by the ecumenical council of Ephesus (430 A.D.), had the effect at once of quickening the devotion of the people and of drawing forth a more marked manifestation on the part of the church of the belief which had been called into question. The 5th and 6th centuries, both in the East and in the West, exhibit clear evidence of the practice; and the writers of each succeeding age till the Reformation speak with gradually increasing enthusiasm of the privileges of the Virgin Mary, and of the efficacy of her functions as a mediator with her Son. St Bernard, and, still more, St Bonaventura, carried this devotional enthusiasm to its greatest height. The institution of the 'Rosary of the Virgin Mary,' the appointment of a special office in her honour, and, more than all, the fame of many of the sanctuaries which were held to be especially sacred to her worship gave a prominence to the devotion which Protestants find it difficult to reconcile with the honour which they hold due to God alone. The chief festivals of the Virgin, common to the Western and Eastern churches, are the Conception, the Nativity, the Purification, the Annunciation, the Visitation, and the Assumption. The Roman Church has several other special festivals, with appropriate offices—all, however, of minor solemnity. For accounts of representations of Mary in Art, see MADONNA, PIETÁ.

Mary I., queen of England, daughter of Henry VIII. by his first wife, Catharine of Aragon, was born at Greenwich on 18th February 1516. She was in her youth a great favourite with her father, and at the age of seven was betrothed to the Emperor Charles V. In her tenth year she was sent with certain commissioners and a species of viceregal court to the marches of Wales to carry out measures for the better government of the country. She was well educated, a good linguist, and fond of music. She was virtuous and pious, devoted to her mother, and devoted to her church.

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With the divorce of her mother her troubles began. Henry treated her with great harshness, and even forced her to sign a declaration that he was supreme head of the church, and that her mother's marriage had been 'by God's laws and man's law incestuous and unlawful.' During the reign of her half-brother Edward she lived in retirement, and no threats could induce her to conform to the new religion. On the death of Edward (6th July 1553), she became entitled to the crown by her father's testament and the parliamentary settlement. The Duke of Northumberland had, however, induced Edward and his council to set Henry's will aside in favour of Lady Jane Grey, to whom the duke had married his son Guildford Dudley. Lady Jane was proclaimed on 10th July, but the whole country suspected Northumberland and favoured Mary, who, supported by her friends, was able without bloodshed to enter London on 3d August in triumph. The queen now showed remarkable leniency towards her opponents. Northumberland and two others were executed as traitors, but Lady Jane and her husband were, for the present, spared. She had promised the mayor of London that she would not strain consciences, and she proceeded very gradually and cautiously to bring back the old religion. She reinstated the Catholic bishops and imprisoned some of the leading Reformers, but dared not restore the pope's supremacy, and she herself retained, under the advice of Gardiner, the title of supreme head of the church. Cardinal Pole was immediately on her accession designated papal legate, but prudence and the counsel of the emperor prevented his entering England. The question of the hour upon which all turned was the queen's marriage. Some thought of Courtenay, Earl of Devon; others of Cardinal Pole, then only in deacon's orders; but the queen, in the face of the fears and protests of the nation, obstinately and morbidly set her heart on Philip of Spain. The unpopularity of the proposal brought about the rebellion of Wyatt and an attack upon London. The rebellion was quelled mainly through the courage and coolness of the queen, but the consequences of her easy triumph were fatal to her. The hapless Lady Jane, who had seemingly been detained as a hostage for the good-behaviour of her friends, was with her husband and father brought to the block. The Princess Elizabeth was suspected, but without proof, of complicity in the treason, and was committed to the Tower. Injunctions were sent to the bishops to restore ecclesiastical laws to their state under Henry VIII. In July 1554, twelve months after her accession, Philip landed and was married to Mary at Winchester. In the November following Pole entered England, and parliament, having made it sure that restitution would not be exacted from the owners of the confiscated church property, consented to petition for reconciliation to the holy see, and the realm was solemnly absolved from the papal censures. Soon after, the savage persecution which gave to the queen the name of 'Bloody Mary' began. In 1555 Ridley, Latimer, and other martyrs were brought to the stake. Cranmer was burned in March 1556, and Pole was consecrated Archbishop of Canterbury in his place. In August 1555 Philip had left England, to return only once more for a few weeks, and Gardiner died in November of the same year. Pole was now left supreme in the councils of the queen, and still the persecution raged; during the last three years of her reign some 300 victims perished in the flames. How far Mary herself was responsible for the cruelties practised is doubtful. During this period she was rendered almost helpless with ill-health. She was constantly deluded with the belief that she was about to become a mother. Broken down with sickness, with grief at her husband's heartlessness, and with disappointment at her childlessness, she became a prey to the deepest melancholy. Finally the evils which the nation predicted from the Spanish alliance came about. The queen was induced by Philip to enter upon war with France. The consequence was the loss of Calais to England. Mary died 17th November 1558.

See the histories of Lingard and Froude; *England under the reigns of Edward VI. and Mary*, by P. F. Tytler; *Privy Purse Expenses of the Princess Mary*, with a memoir by Sir F. Madden; and other books cited at HENRY VIII., ELIZABETH, GREY (LADY JANE).

Mary II. (1662–94), wife from 1677 of William III. (q.v.).

Mary Queen of Scots was the daughter of James V. of Scotland by his second wife, Mary of Lorraine, daughter of Claude, Duke of Guise (q.v.), and widow of Louis of Orleans, Duke of Longueville. She was born at Linlithgow on the 8th of December 1542. Her misfortunes may be said to have begun with her birth. The tidings reached her father on his death-bed at Falkland, but brought him no consolation. 'The deil go with it!' he muttered, as his thoughts wandered back to the marriage with Bruce's daughter, which brought the crown of Scotland to the Stewarts—'it cam with ane lass, and it will pass with ane lass!' Mary became a queen before she was a week old. Within a year the Regent Arran had promised her in marriage to Prince Edward of England, and the Scottish parliament had declared the promise null. War with England followed, and at Pinkie Cleuch the Scots met a defeat only less disastrous than Flodden. But their aversion to an English match was unconquerable; they hastened to place the young queen beyond the reach of English arms, on the island of Inchmahome, in the Lake of Menteith, and to offer her in marriage to the eldest son of Henry II. of France and Catharine de' Medici. The offer was accepted; and in July 1548 a French fleet carried Mary from Dumbarton, on the Clyde, to Roscoff, in Brittany, whence she was at once conveyed to St Germain-en-Laye, and there affianced to the Dauphin.

Her next ten years were passed at the French court, where she was carefully educated along with the king's family, receiving instruction in the art of making verses from the famous Ronsard. On the 24th of April 1558 she was married to the Dauphin, who was six weeks younger than herself. It was agreed, on the part of Scotland, that her husband should have the title of King of Scots; but Mary was further betrayed into the signature of a secret deed, by which, if she died childless, both her Scottish realm and her right of succession to the English crown (she was the great-granddaughter of Henry VII.) were conveyed to France. On the 10th of July 1559 the death of the French king called her husband to the throne by the title of Francis II. The government passed into the hands of the queen's kinsfolks, the Duke of Guise and the Cardinal of Lorraine; but their rule was short-lived. The feeble and sickly king died on the 5th of December 1560, when the reins of power were grasped by the queen-mother, Catharine de' Medici, as regent for her next son, Charles IX. Mary must have been prepared, under almost any circumstances, to quit a court which was now swayed by one whom, during her brief reign, she had taunted with being 'a merchant's daughter.' But there were other reasons for her departure from France. Her presence was urgently needed in Scotland, which the death of her mother, a few months before, had left without a government, at a moment when it was convulsed by the throes of the Reformation. Her kinsmen of Guise had ambitious projects for her marriage; great schemes

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were based on her nearness of succession to the English crown; and both these, it was thought, might be more successfully followed out when she was seated on her native throne.

She sailed from Calais on the 15th, and arrived at Leith on the 19th August 1561, having escaped the English ships of war which Elizabeth despatched to intercept her. Her government began auspiciously. The Reformation claimed to have received the sanction of the Scottish parliament, and if Mary did not formally acknowledge the claim, she was at least content to leave affairs as she found them, stipulating only for liberty to use her own religion—a liberty which Knox and a few of the more extreme Reformers denounced as a sin against the law of God. She is said to have rejected the violent counsels of the Roman Catholics; it is certain that she surrounded herself with Protestant advisers, her chief minister being her illegitimate brother, James Stuart, whom she soon afterwards created Earl of Moray. Under his guidance, in the autumn of 1562, she made a progress to the north, which, whatever was his design, ended in the defeat and death of the Earl of Huntly, the powerful chief of the Roman Catholic party in Scotland. For the Chastelard episode, see CHASTELARD.

Meanwhile the courts of Europe were busy with schemes for Mary's marriage. The king of Sweden, the king of Denmark, the king of France, the Archduke Charles of Austria, Don Carlos of Spain, the Duke of Ferrara, the Duke of Nemours, the Duke of Anjou, the Scottish Earl of Arran, and the English Earl of Leicester were proposed as candidates for her hand. Her own preference was for Don Carlos, the heir of what was then the greatest monarchy in Christendom; and it was not until all hopes of obtaining him were quenched that she thought seriously of any other. Her choice fell, somewhat suddenly, on her cousin, Henry Stewart, Lord Darnley, son of the Earl of Lennox, by his marriage with a granddaughter of King Henry VII. of England. He was thus among the nearest heirs to the English crown, and his claims to the succession were believed to have the support of the great body of English Roman Catholics. But except this and his good looks he had no other recommendation. He was weak, needy, insolent, and vicious; his religion, such as it was, was Roman Catholic; his house had few friends and many enemies in Scotland; and he was three years younger than Mary. Her best friends, both Roman Catholic and Protestant, warned her against him, but in vain. The marriage was celebrated at Holyrood on the 29th July 1565. It was the signal for an insurrection by Moray and the Hamiltons, who hoped to be joined by the whole Protestant party. But their hope was disappointed; and the queen, taking the field in person, at once quelled the revolt, and chased the rebels beyond the Tweed.

Her triumph was scarcely over when misunderstandings began to arise between her and her husband. Darnley's worthlessness and folly became only too apparent; she was disgusted by his debauchery, and alarmed by his arrogance and ambition. She had given him the title of king, but he now demanded that the crown should be secured to him for life, and that, if the queen died without issue, it should descend to his heirs. Mary hesitated to comply with a demand which would have set aside the settled order of succession; and what she refused to grant by favour the king prepared to extort by force.

Mary's chief minister, since Moray's rebellion, had been David Rizzio, a mean-looking Italian, of great astuteness and many accomplishments, but generally hated beyond the palace walls as a base-born foreigner, a court favourite, and a Roman Catholic. The king and Rizzio had been sworn friends, sharing the same table, and even sleeping in the same bed; but the king was now persuaded that it was Rizzio who was the real obstacle to his designs upon the crown. In this belief, he entered into a formal compact with Moray, Ruthven, Morton, and other chiefs of the Protestant party, undertaking, on his part, to prevent their attainder, or procure their pardon, and to support and advance the Protestant religion; while they, on the other part, bound themselves to procure the settlement of the crown upon him and his heirs, and to take and slay, if need were, even in the queen's palace and presence, every one who opposed it. The result of this conspiracy was the murder of Rizzio on the 9th of March 1566, the king leading the way into the queen's cabinet, and holding her in his grasp, while the murderers dragged the poor Italian into an ante-chamber, and, mangling his body with more than fifty wounds, completed what they deemed a justifiable act. When Mary learned what had been done she broke out in reproaches against the king as being the chief cause of the deed. 'I shall be your wife no longer,' she told him, 'and shall never like well till I cause you have as sorrowful a heart as I have at this present.' As had been agreed beforehand among the conspirators, Mary was kept prisoner in Holyrood; while the king, of his own authority, dismissed the parliament which was about to forfeit Moray and his associates in the late insurrection. The plot was thus far successful; but Mary no sooner perceived its objects than she set herself at work to defeat them. Dissembling her indignation at her husband's treachery and the savage outrage of which he had been the ringleader, she succeeded by her blandishments in detaching him from the conspirators, and in persuading him not only to escape with her from their power by a midnight flight to Dunbar, but to issue a proclamation in which he denied all complicity in their designs. The conspiracy was now at an end; Ruthven and Morton fled to England, while Moray was received by the queen; and the king, hated by both sides, because he had betrayed both sides, became an object of mingled abhorrence and contempt.

It was an aggravation of the murder of Rizzio that it was committed, if not in the queen's presence, at least within a few yards of her person, only three months before she gave birth (on the 19th June 1566) to the prince who became James VI. As that event drew near, the queen's affection for her husband seemed to revive; but the change was only momentary; and before the boy's baptism, in December, her estrangement from the king was greater than ever. Divorce was openly discussed in her presence, and darker designs were not obscurely hinted at among her friends. The king, on his part, spoke of leaving the country; but before his preparations were completed he fell ill of the smallpox at Glasgow. This was about the 9th of January 1567. On the 25th Mary went to see him, and, travelling by easy stages, brought him to Edinburgh on the 31st. He was lodged in a small mansion beside the Kirk of the Field, nearly on the spot where the south-east corner of the university now stands. There Mary visited him daily, and slept for two nights in a room below his bedchamber. She passed the evening of Sunday the 9th of February by his bedside, talking cheerfully and affectionately with him, although she is said to have dropped one remark which gave him uneasy forebodings—that it was much about that time twelvemonth that Rizzio was murdered. She left him between ten and eleven o'clock to take part in a masque at Holyrood, at the marriage of

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a favourite valet. The festivities had not long ceased in the palace, when, about two hours after midnight, the house in which the king slept was blown up by gunpowder; and his lifeless body was found in the neighbouring garden.

The chief actor in this tragedy was undoubtedly James Hepburn, Earl of Bothwell (q.v.), an unscrupulous noble, who, since Moray's revolt, and still more since Rizzio's murder, had enjoyed a large share of the queen's favour. But there were suspicions that the queen herself was not wholly ignorant of the plot, and these suspicions could not but be strengthened by what followed. On the 12th of April Bothwell was brought to a mock-trial, and acquitted; on the 24th he intercepted the queen on her way from Linlithgow to Edinburgh, and carried her, with scarcely a show of resistance, to Dunbar. On the 7th of May he was divorced from the young and comely wife whom he had married little more than a twelvemonth before; on the 12th Mary publicly pardoned his seizure of her person, and created him Duke of Orkney; and on the 15th—only three months after her husband's murder—she married the man whom every one regarded as his murderer.

This fatal step at once arrayed her nobles in arms against her. She was able to lead an army against them, but it melted away without striking a blow on the field of Carberry (15th June), when nothing was left to her but to abandon Bothwell and surrender herself to the confederate lords. They led her to Edinburgh, where the insults of the rabble and grief at parting with Bothwell threw her into such a frenzy that she refused all nourishment, and, rushing to the window of the room in which she was kept prisoner, called for help, and showed herself to the people half-naked.

From Edinburgh she was hurried to Lochleven, where, on the 24th of July, she was prevailed upon to sign an act of abdication in favour of her son, who, five days afterwards, was crowned at Stirling. Escaping from her island-prison (where she was confined of still-born twins) on the 2d of May 1568, she found herself in a few days at the head of an army of 6000 men. On the 12th it was met and defeated by the Regent Moray at Langside, near Glasgow. Four days afterwards, in spite of the entreaties of her best friends, Mary crossed the Solway, and threw herself on the protection of Queen Elizabeth, only to find herself a prisoner for life. From Carlisle, her first place of captivity, she was taken, in July, to Bolton; from Bolton she was carried, in February 1569, to Tutbury; from Tutbury she passed in succession to Wingfield, Coventry, Chatsworth, Sheffield, Buxton, Chartley, and last of all to Fotheringhay. The presence of Mary in England was a constant source of uneasiness to Elizabeth and her advisers. A large minority in the country were still Catholic, and naturally looked to Mary as the likely restorer of the old faith. Plot followed plot, therefore, to effect her deliverance, and to place her on the throne of Elizabeth. Of these plots the most famous is that of Antony Babington, which had for its object the assassination of Elizabeth and the deliverance of Mary. The conspiracy was discovered; certain letters of Mary approving the death of Elizabeth fell into the hands of Walsingham; and, mainly on the evidence of copies of these letters, Mary was brought to trial in September 1586. Sentence of death was pronounced against her on the 25th of October; but it was not until the 1st of February 1587 that Elizabeth took courage to sign the warrant of execution. It was carried into effect on the 8th, when Mary laid her head upon the block with the dignity of a queen and the constancy and resignation of a martyr, evincing to the last her devotion to the church of her fathers. Five months afterwards her body was buried with great pomp at Peterborough, whence, in 1612, it was removed to King Henry VII.'s Chapel at Westminster, where it still lies in a sumptuous tomb erected by James VI.

The character of Mary was long one of the most fiercely-vexed questions of history, and is still in debate, although the great preponderance of authority seems now to be on the side of those who believe in her criminal love for Bothwell and her guilty knowledge of his conspiracy against her husband's life. Her beauty and accomplishments have never been disputed. She was confessed by every one to be the most charming princess of her time. Her large sharp features might perhaps have been thought handsome rather than beautiful, but for the winning vivacity and high joyous spirit which animated them. It has been questioned whether her eyes were hazel or dark gray, but there is no question as to their star-like brightness. Her complexion, although fresh and clear, would seem to have been without the brilliance so common among our island beauties. Her hair appears to have changed with her years from a ruddy yellow to auburn, and from auburn to dark brown or black, turning gray long before its time. Her bust was full and finely shaped, and she carried her large stately figure with majesty and grace. She showed to advantage on horseback, and still more in the dance. The charm of her soft, sweet voice is described as irresistible; and she sang well, accompanying herself on the harp, the virginal, and still oftener on the lute, which set off the beauty of her long, delicate, white hand. The consciousness how that hand was admired may have made it more diligent in knitting and in embroidery, in both of which she excelled. Her manner was sprightly, affable, kindly, frank perhaps to excess, if judged by the somewhat austere rule already beginning to prevail among her Scottish subjects. She spoke three or four languages, was well and variously informed, talked admirably, and wrote both in prose and in verse, always with ease, and sometimes with grace or vigour. In the ring of which she was the centre were statesmen like Moray and Lethington, soldiers like Kirkaldy of Grange, men of letters like Buchanan, Leslie, Sir Richard Maitland, and Sir James Melville. The first poet of France published verses deploring his absence from her brilliant court; Damville, the flower of French chivalry, repined at the fate which called him away from it so soon; Brantôme and the younger Scaliger delighted to speak, in old age, of the days which they passed beneath its roof.

Mary's prose-writings have been collected by the enthusiastic devotion of Prince Alexander Labanoff, in his *Recueil des Lettres de Marie Stuart* (7 vols. 1844). Setting aside the twelve so-called 'sonnets' which she is said to have written to Bothwell, and which survive only in a French version of an English translation, no more than six pieces of her poetry, containing in all less than 300 lines, are now known. They have no remarkable merit. The best is the poem of eleven stanzas on the death of her first husband, Francis II., printed by Brantôme. The longest is a *Meditation* of a hundred lines, written in 1572, and published two years afterwards by her ever faithful follower, Bishop Leslie of Ross. All are in French, except one sonnet, which is in Italian. The sweetly simple lines beginning 'Adieu, plaisant pays de France,' so often ascribed to her, are probably the work of A. G. Meusnier de Querlon, a French journalist, who died in 1780. A volume of French verse on the *Institution of a Prince*, which she wrote for the use of her son, has been lost since 1627, along with a Latin speech in vindication of learned women, which, when no more than thirteen,

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she delivered in the hall of the Louvre, in presence of the French court.

To enumerate all that has been written on Mary would fill a volume. Among the chief works are Jebb's *De Vita et Rebus Gestis Mariæ Scotorum Reginæ* (1725); J. Anderson's *Collections Relating to the History of Mary, Queen of Scotland* (1727–28); Bishop Keith's *History of the Affairs of Church and State in Scotland* (1734; new ed. 1844–50); W. Goodall's *Examination of the Letters said to be written by Mary, Queen of Scots, to James, Earl of Bothwell* (1754); Principal Robertson's *History of Scotland*; W. Tytler's *Inquiry into the Evidence against Mary, Queen of Scots* (1759, 1790); M. Laing's *History of Scotland*; G. Chalmers's *Life of Mary, Queen of Scots* (1818, 1822); P. F. Tytler's *History of Scotland*; Prince Labanoff's *Recueil des Lettres de Marie Stuart* (1844); David Laing's edition of *John Knox's History of the Reformation* (1846–64); the Life by Miss Strickland in her *Lives of the Queens of Scotland* (1850–59; new ed. 1873); A. de Montaiglon's *Latin Themes of Mary Stuart* (1855); Prince Labanoff's *Notice sur la Collection des Portraits de Marie Stuart* (1856); Mignet's *Histoire de Marie Stuart* (1852); Teulet's *Lettres de Marie Stuart* (1859); Cheruel's *Marie Stuart et Catherine de Medicis* (1858); Joseph Robertson's *Catalogues of the Jewels, Dresses, Furniture, Books, and Paintings of Mary, Queen of Scots* (1863); Hosack's *Mary, Queen of Scots, and her Accusers* (1870–74; a popular ed. 1888); histories by Petit and De Flandre (1874), Chantelauze (1876), and the interesting document by Claude Nau, her secretary (ed. by Father Stevenson, 1883); Leader, *Mary Stuart in Captivity* (1881); Baron Kervyn de Lettenhove, *Marie Stuart* (2 vols. 1889). The question of the genuineness of the so-called Casket Letters has of late passed into a new phase by the discovery of Morton's Declaration regarding the manner in which the Casket fell into his hands. For an account of this document and its bearing on the question of Mary's authorship of the letters, see Henderson's *Casket Letters* (Edin. 1890). Reference to the latest literature on the subject will be found in Mr Henderson's book.

The best representations of Mary are the contemporary portraits by the French painter, Francis Clouet, more commonly called Jehannet or Janet, and the statue, by an unknown sculptor, on her tomb at Westminster. All portraits which cannot be reconciled with these types may safely be rejected as spurious.

Maryborough, a port of Queensland, on the Mary River (here spanned by a wooden bridge), 25 miles from its mouth and 180 N. of Brisbane, with which there is communication by steamer and coach. The wharves admit vessels drawing 17½ feet. Gold from Gympie (61 miles by rail) and copper from Mount Parry and other mines, with sugar and timber, form the chief exports. There are two dozen sugar-mills at work in the neighbourhood, and three iron-foundries, and brewing, tanning, and shipbuilding are carried on. Pop. (1886) 9000.

Maryland lies between the parallels of 37° 53′ and 39° 44′ N. lat., and the meridians of 75° 4′ and 79° 33′ W. long. It contains 12,210 sq. m.—very nearly the size of Holland—of which about one-fifth is water. The length from east to west is 196 miles, and the breadth 128 miles. On the north and east it is separated from Pennsylvania and Delaware by 'Mason and Dixon's Line' (q.v.); the south-western border follows the course of the Potomac River, the whole of which, with the exception of about 12 miles in the District of Columbia (q.v.), is under the jurisdiction of Maryland, down to the low-water mark on the Virginia side.

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The surface elevation varies greatly, from sea-level to an altitude of 3500 feet. In the west it is mountainous (see BLUE RIDGE); in the middle hilly and rolling; in the east and south-east low and undulating. A line drawn from the mouth of the Susquehanna to the city of Washington will cut the state into two nearly equal parts, and divide the mountain and hill country from the low lands on both sides of the Chesapeake Bay. The productions and occupations are largely determined by the physical features—in the west coal and lumber; in the middle corn and wheat; in the east fish, fruit, and vegetables. The climate is generally regarded as unusually healthful. The mean summer temperature is 75°, the mean winter temperature 34°. The annual rainfall varies from 38 inches in the mountains to 46 inches near the Atlantic coast. The mountain air is regarded as a specific for hay-fever. The prevalent diseases on the shores of the Atlantic and the Chesapeake Bay were formerly bilious and intermittent fevers of a mild form, and they still exist to some extent in these districts.

The geological formations vary with the surface elevations. The southern section of both the eastern and western shores is alluvial; north of the alluvial deposit is a tertiary formation; north-west of this come metamorphic rocks; west of them a wide belt of Silurian and Devonian formation; and still farther west Carboniferous strata beginning at Cumberland. In the Tertiary we find marl in abundance; in the metamorphic rocks gneiss, granite, limestone, and iron; in the Carboniferous extensive veins of bituminous coal of the best quality. One remarkable vein in the George's Creek district is 14 feet thick. Over 200 kinds of marble have been found in the state, some of them equal to the Italian marbles. Copper-mines are extensively worked in the middle district; and almost all the chrome used in the United States comes from the same location. Near Baltimore are large beds of clay, from which bricks of peculiar excellence and beauty are manufactured; and in an adjoining county valuable quarries of soapstone are worked with profit.

The soil is well adapted to cultivation, with the exception of the mountain tops in the west, and a small proportion of marsh land in the east, which might, however, be easily and profitably reclaimed. The forest-trees are principally pine, chestnut, and oak; hickory and walnut are becoming scarce. The staple fruit-tree is the peach, which covers many thousands of acres: Maryland peaches, preserved in air-tight cans, are exported to all quarters of the world. Tobacco is the principal crop in the peninsula between the Chesapeake and the Potomac, as it was the main reliance of the early settlers, constituting even their ordinary medium of exchange. Tomatoes, melons, small fruits, and all kinds of vegetables are cultivated on the eastern shore and sent to the markets of Baltimore and Philadelphia. The mountains still contain many deer; and wild geese, swans, and turkeys are found in considerable numbers at the proper season, as well as woodcock, grouse, and quail (locally called partridge). Immense flocks of wild ducks of various species throng the estuaries of the Chesapeake on the approach of cold weather: the 'canvas-back' is found nowhere else in perfection.

The Chesapeake Bay (q.v.) divides Maryland into two unequal portions, the Eastern and the Western Shore. With its estuaries it gives the state a coast-line of more than 500 miles, and almost that number of steamboat landings: on the Eastern Shore there is scarcely a farm more than 5 miles distant from a navigable river, accessible to steamboats of light draught. Shad and herring are caught in large numbers, and the average annual supply of oysters reaches 20 millions of bushels, giving employment to more than 30,000 persons. For the leading manufactures, see BALTIMORE, where most are located. Baltimore is also the principal port and great commercial centre of the state. Maryland has about 1300 miles of railway, and two canals (from Cumberland, in the west, to Washington, 184½ miles, and between the Chesapeake and Delaware Bays, 12½ miles).

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Maryland has a well-developed system of free public schools. In 1889 there were in attendance 179,460 pupils, of whom 34,072 were coloured, who are educated in separate schools, but under the same management. There is in every county a high school or academy which gives secondary instruction and fits pupils for college. The colleges supported in whole or in part by the state are St John's College, Annapolis (originally King William's School); Washington College, Chestertown, Kent county, to the foundation of which George Washington contributed £100 sterling; the Agricultural College, near Bladensburg; and the Western Maryland College, Westminster. There are also several denominational colleges. The foremost of the educational institutions of Maryland is the Johns Hopkins University, in Baltimore. There is a school for the feeble-minded at Pikesville; a school for the deaf and dumb at Frederick; and in Baltimore a school for the blind, and a school for coloured blind children and deaf-mutes, all supported by the state at an annual expense of about $60,000. The asylum for the insane at Catonsville is admirably managed.

Maryland returns six members to congress. The Legislature is styled the General Assembly, and consists of two houses—the Senate and the House of Delegates. The Senate is composed of one member from each of the twenty-three counties and three from the city of Baltimore, elected by the people. The House of Delegates has ninety-one members, eighteen from Baltimore city, and the remainder from the counties in proportion to their respective population. The seat of government is at Annapolis. Baltimore had in 1890 a pop. of 434,151. The other principal towns are Cumberland, Hagerstown, Frederick, Westminster, on the western shore; Salisbury, Easton, and Cambridge, on the eastern. Pop. (1830) 447,030; (1860) 687,049; (1880) 934,943; (1890) 1,070,000.

History.—In 1632 Charles I. of England issued a patent to Cecil Calvert, Lord Baltimore, granting him all the land 'from Watkins Point on the Bay, northward to the 40th degree of latitude, and from the Atlantic Ocean and Delaware Bay on the east to the Potomac River on the west.' This grant included not only the present Maryland, but also parts of Pennsylvania and Delaware, which led to many vexatious disputes, some of which were settled only in 1890. The district was named in honour of Henrietta Maria, Charles's queen. In March 1634 a party of English gentlemen and their servants and retainers, under the command of Leonard Calvert, a brother of Lord Baltimore, landed on the shore of a river now called St Mary's, a branch of the Potomac, and bought from the Indians a tract of land. The friendly relations thus commenced with the Indians, and but rarely interrupted, together with the announcement of toleration and protection to all Christians of whatever shade of religious belief, led to the rapid and peaceful growth of the new colony. Maryland was among the first of the colonies to take an active part in the war of independence. In the war between the states (1861–65) the people of Maryland were divided in sentiment, but the state remained within the Union. See J. T. Scharf, *History of Maryland* (3 vols. Baltimore, 1879).

Maryport, a seaport of Cumberland, at the mouth of the Ellen, 28 miles SW. of Carlisle by railway (1837). The town gets its name from the fact that Mary Queen of Scots landed here in her flight from Scotland, though it was called Ellenfoot down to 1750, when its harbour was constructed. A new dock was opened in 1884. Shipbuilding and its kindred employments are carried on, and there are iron-foundries and iron-furnaces, sawmills, flour-mills, tanneries, breweries, &c. The annual value of the total exports, chiefly coal and iron, in 1885 to 1889 ranged from £67,000 to £544,000; the imports of foreign and colonial merchandise in the same period ranged from £179,000 to £136,000. The average number of vessels entering is about 1550, of some 220,000 tons burden. Pop. (1851) 5698; (1881) 8126.

Marysville, capital of Yuba county, California, on the Yuba River, at the head of navigation, 52 miles by rail N. of Sacramento. It is a great resort of gold-miners, has an extensive trade, and contains flour-mills, a foundry, woollen factory, &c. Pop. 4300.

Masaccio, a Florentine painter, whose proper name was Tommaso Guidi, was born in 1401 or 1402 in the Arno valley, probably at Castel San Giovanni. He was nicknamed Masaccio ('Slovenly Tommy') because of his ungainly appearance and careless manners. A reputed pupil of Masolino, he was enrolled in the Florentine guild of painters in 1424. Whilst still a young man he seems to have executed a fresco of the Crucifixion and scenes illustrating the lives of some of the later saints in the church of St Clement. But his greatest achievements were wrought on the walls of the Carmine church, especially in the Brancacci chapel. It has been matter of controversy as to which pictures precisely were from the brush of Masaccio; Masolino worked at the same walls before him and Filippino Lippi after him. Those which are assigned to him beyond doubt or question are 'Expulsion from Paradise' (greatly admired by Raphael, who repeated the design in the loggie of the Vatican), 'Peter and the Tribute-money,' 'Temptation of Adam and Eve,' 'Peter Preaching,' and the same saint 'Baptising,' 'Healing the Sick,' 'Giving Alms,' and (in part) 'Restoring the Young Man to Life.' These works mark an advance in Italian painting, in that they exhibit a more vigorous and correct representation of nature, with improved perspective and harmony of arrangement between the figures and the background. Many of the subsequent 15th-century painters of Italy were greatly influenced by the study of them. Towards the end of 1428 Masaccio suddenly left Florence, and is reported to have gone to Rome and to have died there before the year 1429 ran out.

Masai, a people of East Equatorial Africa, dwelling in a district that stretches from 1° N. to 5° S. lat., and from 34° to 38° E. long., and includes Kilimanjaro, Kenia, and Lake Baringo. The southern half of the district is low and barren, with no rivers and little rain, whilst in the north it rises into a plateau-region (5000 to 9000 feet), rich in running streams, forests, and grass-land. The Masai are not a Negro or Bantu race; they resemble the Gallas, being men of magnificent stature and Apollo-like forms, though their faces are ugly and ferocious in expression. This is due to the warlike habits of their youth, when, for nearly a score of years, they live in military kraals, spending their time in alternate idleness and on the war-path, eating nothing but beef, drinking nothing but milk, and having indiscriminate intercourse with the unmarried girls of the tribe. After marriage, which takes place when they lay aside the habits of the warrior, they settle down as cattle-breeders. The arms of the warriors consist of an ox-hide shield, a spear with a blade 2 to 2½ feet long and 3 inches broad, affixed to a shaft of 15 inches, a sword, and a knobkerry. They are an aristocratic race, and clever public speakers. The work is done by slaves and by the women and boys. They speak a Hamitic language. See Joseph Thomson, *Through Masai Land* (1885), and compare H. H. Johnston, *Kilimanjaro Expedition* (1886).

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Masaniello (properly TOMMASO ANIELLO), a fisherman of Amalfi, born in 1623, was the leader of the revolt which took place in Naples in July 1647 against the Spanish viceroy, the Duke of Arcos. The people had been exasperated by oppression, and great excitement had been produced by a new tax upon fruit. Masaniello himself was aggrieved by the harsh treatment which his wife had received after being detected in an attempt to smuggle a little flour. Taking advantage of a quarrel between the fruit-sellers and the tax-collectors on 7th July 1647, Masaniello stirred up the multitude to a revolt. Their triumph was complete; palaces and public buildings were plundered, mostly for arms, a bloody popular justice was executed, and the viceroy was forced into a regular treaty with Masaniello in the church of the Carmelites on 13th July. But success and the weight of his responsibilities turned the fisherman's head; he gave himself up to excess, and his capricious despotism immediately became terrible to his own associates. He was assassinated by agents of the viceroy on 16th July.

Masaya, a busy town of Nicaragua, about 20 miles by rail SE. of Managua, near the volcano of Masaya. Pop. 12,000.

Mascara', a town of Algeria, 50 miles SE. of Oran, stands 1800 feet above sea-level, on a slope of the Atlas Mountains. It was for some time (1832–41) the headquarters of Abd el-Kader. Pop. 14,320.

Mascarene Isles, or MASCARENHAS, the collective name given to the islands of Réunion, Mauritius, and Rodriguez.

Masham, MRS. See MARLBOROUGH.

Mashonaland, or MASHUNALAND, is the name of the region lying north-east of Matabeleland, between 16° 30′ and 19° 10′ S. lat. and 30° and 32° E. long. It embraces the plateau (4000–4600 feet) whose backbone is formed by the Umvukwe Mountains, and in which some of the chief feeders of the Zambesi, Limpopo, Sabi, and Mazoe have their origins. It is reported to be the healthiest part of South Africa, with rich soil, grass all the year round, and an abundance of running streams. A constant cold south-east wind tempers the heat, and renders the air strong and bracing. When their land was invaded by the Matabele, those of the Mashona who escaped massacre took refuge in the mountainous districts, and there they have ever since maintained themselves, building their villages on almost inaccessible crags. A peaceful and industrious people, of Bantu race, they live in perpetual fear of their fierce neighbours. They are the best husbandmen in South Africa, and before being dispossessed of their country owned large herds of cattle. They now grow rice, Kaffir corn, maize, ground-nuts, sweet potatoes, tobacco, and cotton; this last they weave into blankets. They are also good iron-workers. Iron, copper, and gold (in quartz and river sand) exist in immense quantities in the country. Mauch, a German traveller, in 1871 discovered many old mines that had at one time been worked with some degree of scientific skill, especially at a place called Zimbabye, which he identified with the Ophir (q.v.) of the Bible, and thus gave some support to Milton's identification of that region with Sofala. Mashonaland was put under British protection on 11th February 1888, and was taken actual possession of by the British South Africa Company in August 1890.

The MAKALAKA are a people closely allied to the Mashona, and have had nearly the same history. Those who escape the Matabele live chiefly in the mountain fastnesses in the southern part of Matabeleland, and follow the same occupations and mode of life as the Mashona. The Banyai tribes—likewise refugees from the Matabele—live south-east of the Makalaka, along the middle course of the Limpopo. See books quoted under MATABELELAND.

Masinissa, king of the Eastern Numidians, was born about 238 B.C., and brought up at Carthage. Having helped the Carthaginians to subdue Syphax, king of the Massylii or Western Numidians, he accompanied his allies to Spain and fought valiantly and successfully against the Romans. But about 210 the Carthaginians gave his promised bride to Syphax; and for this and other reasons he became henceforward the bitter foe of Carthage, and zealously backed up the Romans in their struggle against their African rival. He received as his reward the kingdom of Syphax, together with large portions of the territory of Carthage. But before he died, in 149 B.C., he saw that he had fostered a most dangerous enemy for his own people, the Massylii, and the kingdom he left to his sons, and slackened his zeal for Rome.

Mask (through the medium of Fr. and Span. from the Arabic *maskharat*, 'a jester') is an artificial covering for the face, worn by many different peoples for different purposes. Masks are common amongst the inhabitants of New Britain, New Ireland, New Guinea, and the adjoining islands, amongst the North American Indians and the Eskimo, the Chinese, the aborigines of Australia, and some Negro tribes. The masks these peoples use are generally very hideous and repellent in aspect, being designed expressly to inspire terror in the mind of the beholder. The primary object is to scare away the demons and spirits who bring misfortunes, diseases, national calamities, or other evils upon the tribe; the exorcism is usually practised by processions of masked men, who dance and utter loud cries calculated to frighten the enemy away. Where totemistic beliefs prevail, it is customary for the people to celebrate dances clad in the skins of wild animals, and on such occasions masks are worn shaped to resemble the animals represented in the dance. It is highly probable that practices of a similar nature were current amongst the primitive Greeks, Egyptians, and other peoples. The myth of the snaky-haired Gorgon is traced back to this origin; so too is the practice of covering the faces of the dead with a mask, intended to keep the demons away from them whilst they were on their journey to the abode of shades, a practice common to the ancient Greeks and Egyptians, and the ancient Peruvians and Mexicans. Death-masks of gold have been found in tombs of Mycenæ and Kertch; those of the Peruvians were made of silver and wood; some found at Carthage were of clay, painted in divers colours; and copper and wood were used in Mexico. Masks, besides being worn by living men, were sometimes attributed to their gods, as in ancient Egypt and Greece, and in India, or were put on over the faces of the gods' images, as in ancient Mexico. The Greeks, moreover, in their theatrical performances, employed masks shaped to represent the expression of a particular emotion or passion, as rage, grief, sly cunning, &c. These, made of linen, tree-bark, leather, or even wood, had large funnel-shaped mouth-openings, for the purpose of giving the voice of the actor a penetrating sound (whence Lat. *per-sona* = 'a mask'), so that it might be heard all over the vast theatres in which he had to act. Passing on to the Romans, the custom of putting masked actors on the stage was transmitted by them to the Italian theatres of the middle ages; nearly all the actors in the Commedia dell' Arte wore masks. The custom was also practised in the

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English Masque (q.v.) of Elizabethan and subsequent times. The Masquerade (q.v.) or masked ball is a survival of the same observance; but in them the mask is worn for the purpose of disguising the identity of the wearer, as it was in the case of the Man with the Iron Mask (see IRON MASK).

See Dall, *Masks, Labrets, and Certain Aboriginal Customs* (Washington, 1885); Sand, *Masques et Buffons* (1860); Ficoroni, *De Larvis Scenicis* (1754); and A. B. Meyer, *Masken von Neu-Guinea* (1889).

Maskelyne, NEVIL, D.D., F.R.S., astronomer and physicist, inventor of the prismatic micrometer, was born in London, 6th October 1732. From Westminster School he passed to Catharine Hall, and subsequently to Trinity College, Cambridge, where he obtained a fellowship in 1756. In 1758 he was elected a Fellow of the Royal Society, and resolved to devote himself to astronomy. In 1763 he went to Barbadoes for the Board of Longitude to test the newly-invented Harrison chronometers, and after his return was (1765) appointed astronomer-royal. During the forty-six years that he held this office he acquired universal respect by his diligence and the accuracy of his investigations, made several improvements in the arrangements and employment of the instruments, and was the first to mark the time to tenths of a second. In 1774 he visited Schiehallion, Perthshire, to make observations determining the density of the earth in connection with that hill (see EARTH). The first of his very numerous publications was the *British Mariner's Guide* (1763). In 1767 he commenced the *Nautical Almanac*. His *Tables for computing the Places of the Fixed Stars, &c.* were published by the Royal Society in 1774. In 1776 he produced the first volume of the *Astronomical Observations made at the Royal Observatory, Greenwich, from 1665*—an invaluable work still continued. He was rector from 1775 of Shrawardine, Salop, and from 1782 of North Runcton, Norfolk, and died 9th February 1811.

Mason, GEORGE HEMMING, A.R.A., was born in Staffordshire in 1818. He studied for the medical profession, but in 1844 abandoned it and travelled on the Continent studying art till 1858. His best works were 'The Evening Hymn' (1868), 'Girls Dancing by the Sea' (1869), and 'The Harvest Moon' (1872). He died from heart disease on 22d October 1872. His pictures show great pathos and rich effects of colour. Shortly after his death a collection of his pictures was exhibited by the Burlington Club.

Mason, SIR JOSIAH, manufacturer and philanthropist, born at Kidderminster, 23d February 1795, began life by selling cakes on the street, and after turning his hand to various employments took over the split-ring business of Mr Harrison (1822) at Birmingham. He began to make pens in 1829 for Perry & Co., and his business increased till he became the largest pen-maker in the world. Partner with Elkington in the electro-plating trade (1842–65), he gave Dr (afterwards Sir) C. W. Siemens his first start in life by paying him £1600 for a patent; and he paid Krupp, founder of the works at Essen, £10,000 for the patent for machinery to roll the metal 'blanks' from which spoons and forks are made. Mason erected and endowed almshouses, and an orphanage at Erdington, at a cost of £260,000, and was the founder of the Josiah Mason College at Birmingham. He died at Erdington, June 16, 1881. See the *Memoir* by J. T. Bunce (1890).

Mason, WILLIAM, minor poet, but more famous as the literary executor of Gray, was born son of a Yorkshire clergyman in 1725, studied at St John's College, Cambridge, graduated B.A. in 1745, and was soon after elected Fellow of Pembroke College through the influence of Gray, who had been attracted to him by his *Musæus* (1747), a poetic lament for the death of Pope (1744), in imitation of *Lycidas*. He published later two absurd but ambitious tragedies, *Elfrida* and *Caractacus;* the *English Garden* (1772–82), a long and tedious poem in blank verse; and the *Memoirs of Gray* in 1775, the serious defects of which have at length been demonstrated to all readers through the painstaking and honest labours of Mr Gosse. Mason took orders in 1754, and became vicar of Ashton, in Yorkshire, and later also precentor and canon of York, where he died 7th April 1797.

Mason and Dixon's Line is popularly supposed to have been a line dividing the slaveholding from the non-slaveholding states, and to have run due east and west. In reality it ran for more than one-third of its length between two slave states, Maryland and Delaware, and a small part of it is an arc of a circle. It was run by two English engineers, Charles Mason and Jeremiah Dixon, between the years 1764 and 1767, for the purpose of settling the disputed boundaries between Maryland on the one side and Pennsylvania and Delaware on the other. Their instructions were to begin at the most easterly point on the Atlantic Ocean, and run due west to a point midway between the Atlantic and the Chesapeake Bay; thence northward, so that the line should become a tangent to the north-western boundary of Delaware, which was a circle described from New Castle Court-house as centre, with a radius of 12 miles. The line was then to follow the curve in a westerly direction until it reached a point due north of the point of tangency; thence due north until it intersected a line run due west from a point 15 miles south of Philadelphia; and thence due west until it intersected a line running due north from the most western source of the Potomac River. The work was done with such skill and accuracy that a revision in 1849, with instruments of much greater precision, disclosed no error of importance.

Masonry, the art of construction in stone. The earliest existing examples are among the most magnificent specimens of the art. No nation has excelled the ancient Egyptians, who did not use mortar in their important structures, such as the pyramids, the joints being all carefully polished and fitted. Cyclopean masonry, of which remains exist in many parts of Greece and Italy, also exhibits stones of great size and with carefully-adjusted joints. The walls of Mycenæ are among the earliest examples. These are built with huge irregular blocks, the spaces between being filled up with smaller stones. The Etruscan specimens are more carefully executed; the stones are not squared, but they are all carefully fitted together. The masonry of the Greeks and Romans very closely resembled that of the present day: *Rubble-work* (*opus incertum*), in which the stones are not regularly coursed; *Coursed-work*, where the joints are all level, and the stones of equal height; *Ashlar*, resembling the latter, but built with larger stones carefully dressed on the joints.

The early medieval masonry was of very bad construction, being, in fact, little better than common rubble, with an occasional use of Herring-bone Work. The Normans improved upon this kind of work, but their masonry was also so bad that many of the towers built by them either fell or had to be taken down. The art gradually improved with the advance of Gothic architecture, and ashlar was reintroduced for all important works. The ashlar-work so constantly used in Renaissance buildings has given place to the hammer-dressed and squared masonry. Special materials sometimes produce special kinds of work; thus, in Norfolk and Suffolk,

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where large flints abound, the walls are often faced with these, split so as to form a clean face and good joints, and arranged in bands or panels between stonework or brickwork.

Mas'pero, GASTON CAMILLE CHARLES, Egyptologist, was born at Paris, of Italian parents, on 23d June 1846. He began to lecture on Egyptology at the School of Higher Studies in Paris in 1869, and in 1873 was appointed professor of Egyptology at the College of France. In 1881 he founded a school of Egyptian archæology at Cairo, and succeeded Mariette as director of explorations and custodian of the Boulak Museum. In 1886 he became professor at the Institute of Paris. As an explorer he has excavated or opened the pyramids of the kings belonging to the 5th and 6th dynasties, and the burial-fields of Sakkara and Dahshûr, and discovered new sepulchral sites of great value at Deir el-Bahari, near the entrance to the Valley of the Tombs of the Kings, at Ekhmîm, 130 miles S. of Thebes, and at other places. His most valuable written work includes the excellent *Histoire Ancienne des Peuples d'Orient* (best ed. 1885); *Guide* to the Boulak Museum (2d ed. 1885); *La Trouvaille de Deyr el-Bahri; L'Archéologie Égyptienne* (1887; Eng. trans. 1887); *Contes Populaires de l'Égypte Ancienne* (1882); *Études Égyptiennes* (1879–82); papers in *Recueil de Travaux*, and several other more technical productions.

Masque, a species of dramatic performance, much in vogue in England towards the close of the 16th and the beginning of the 17th century. It was in fact the favourite form of private theatricals at the time. The masque appears to have originated in the practice of introducing, in any solemn or festive processions, men wearing masks, who represented either imaginary or allegorical personages. At first it was simply an 'acted pageant,' as in the well-known progresses of Queen Elizabeth; but gradually it expanded into a regular dramatic entertainment, and in the hands of men like Fletcher and Ben Jonson attained a high degree of literary beauty. Jonson's masques were represented at court, and were greatly relished. The taste for this kind of amusement, however, died away in the reign of Charles I.; nevertheless, to the time of that monarch belongs the finest masque, and one of the most splendid poems ever written—the *Comus* of Milton (1634).

Masquerade, or MASKED BALL, a festive meeting in which the host and guests assume fictitious characters, and disguise themselves more or less for the occasion, the name being derived from the use of the mask. The public *mummeries* of former times, Easter plays, Festivals of Fools, &c., which were frequent in most parts of Europe, but somewhat various in different countries, probably suggested the idea of the masquerade, which, however, was not open to all, according to the well understood rules of these ancient amusements, but was limited to some select class, or to those who paid a certain sum for admission. Catharine de' Medici introduced the regular masquerade at the French court. It found its way to England in the reign of Henry VIII., but did not reach any of the courts of Germany till the end of the 17th century. The *bal costumé* is a very modified and much less objectionable form of the masquerade.

Mass is defined as 'the quantity of matter in a body;' and weight is proportional to mass (see GRAVITATION, MATTER).

Mass. See LITURGY.

Mass, MUSIC OF. Each part of the service of High Mass has its unisonal plain-song melody, varying according to the season or festival; the first collections of these melodies were made by St Ambrose, and afterwards more completely by St Gregory. But since the invention of counterpoint certain portions have been selected for more elaborate treatment—viz. the *Kyrie*, *Gloria*, *Credo*, *Sanctus*, *Benedictus*, and *Agnus Dei*; each of which, but especially the *Credo*, is by common traditional practice divided into separate movements, also designated by the initiatory words. In the early contrapuntal music, a plain-song melody, or even a secular tune, formed the basis on which the whole was constructed, and the mass was named in accordance—e.g. the numerous *Missæ L'Homme Armé*, founded on an old French love-song. This appropriation of secular tunes, which could never wholly lose their association with the often objectionable words, anticipates Shakespeare's Puritan 'who sings Psalms to hornpipes,' and the similar practices of recent revivalists. These compositions soon became more remarkable for their learning and ingenuity than appropriateness or reverential feeling; and to such an extent was this abuse carried that the Council of Trent condemned them in no measured terms, and a commission, appointed in 1564 to carry out certain of its decrees, was on the point of entirely forbidding the use in future of polyphonic music in the church, when the production by Palestrina of his world-famous *Missa Papæ Marcelli* convinced the cardinals that such music could be profoundly devotional as well as technically skilful; and its use was allowed to be continued. The succeeding epoch of church music, however, was one of decline; but in the later part of the 17th and commencement of the 18th centuries arose a new school, comprising Alessandro Scarlatti, Leo, and Durante, in whose compositions the introduction of instrumental accompaniment was the most important new feature; one which gave to all subsequent masses the style of the cantata, more individual and dramatic than devotional. In this style also are the stupendous masses of Bach in B minor, Beethoven in D, and Cherubini in D and A. Of less importance, though full of beautiful music, are those of Haydn, Mozart, Weber, Schubert, and Gounod.

The music of the Requiem, or *Missa pro defunctis*, differs of course considerably in its details from that of the ordinary High Mass. The most famous compositions for it are those of Mozart and Cherubini. Brahms' masterpiece, the German Requiem, is not a mass but a sacred cantata on scriptural words.

Massa, distinguished as MASSA DI CARRARA, a city of Northern Italy, 20 miles by rail SE. of Spezia. It is a bishop's see, has a public library, an academy of arts and sciences, a cathedral, and a ducal palace. The inhabitants, 8998 in 1881, rear silkworms, grow tobacco, press oil, make paper, saw timber, and trade in the white marble that all sculptors use.—The *province* of Massa and Carrara has an area of 648 sq. m., and a pop. (1881) of 169,469; (1889) 186,221. In 1568 the ruling family in Massa were created princes, and in 1664 dukes. The dukedom passed by marriage to the house of Modena-Este in 1741.

Massachusetts, one of the New England states of the American Union, lies between 41° 14′ and 42° 53′ N. lat., and between 69° 53′ and 73° 32′ W. long., and has an area of about 8040 sq. m.—larger than Wales. It is irregular in outline, its greatest length being about 182 and its average breadth 47½ miles. It is bounded on the east by Massachusetts Bay, a part of the Atlantic Ocean, from which the state derives its familiar name of the Bay State. The surface is uneven, varying from low plains, near the sea-coast, containing numerous small lakes, to a rolling country in the interior, becoming mountainous as the western boundary is

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approached. This mountainous portion is composed of two distinct ranges, being part of the Green Mountains, which here extend southward from the adjacent state of Vermont. The highest of the peaks is Greylock (3505 feet), but most of them are wooded to the summit, and the scenery, while not grand, is of great beauty. The soil is in many portions, particularly in the east, rocky and sterile, and the state contains several quarries of importance yielding granite and syenite, red sandstone, and valuable marble. Along the river-valleys, however, and in certain other sections the soil is fertile. The value of farm products for the census year 1885 was $47,756,033; of which $13,080,526 was for dairy products, $11,631,776 for hay and fodder, $5,227,194 for vegetables, $5,446,243 for animals and poultry, $1,855,145 for cereals. The woodland in the state aggregated 1,389,502 acres.

The rivers, while not important for navigation, are the source of valuable water-power which has been utilised in manufacturing, in the annual output of which the state leads all others, except New York and Pennsylvania. The total number of establishments engaged in manufacturing and allied industries in 1885 was 23,431; the capital invested being $500,594,377; stock used, $389,757,458; value of goods made and work done, $674,634,269; number of persons employed, 379,328; total wages paid during the year, $147,415,316. The chief manufactures are textiles, boots and shoes, food preparations, building materials, clothing, iron and other metallic goods, leather, wooden wares, &c. The leading textile industries are cotton (165 establishments, 5,133,325 spindles), woollen (189 establishments), and worsted goods (23 establishments). In 1889 there were 3869 miles of railway in the state.

Massachusetts contains fourteen counties and returns 12 members to congress. The state senate consists of 40, the House of Representatives of 240 members. The executive branch of the government is vested in the governor, who is officially styled the governor of the commonwealth of Massachusetts, and whose title is His Excellency; lieutenant-governor, whose title is His Honour; and an advisory council consisting of eight members chosen by districts. The governor, lieutenant-governor, and heads of the executive departments are elected annually. The cities of the commonwealth must have a population of at least 12,000. The towns (corporate bodies having less than 12,000 pop.) are governed by a board of selectmen elected by popular suffrage in an annual town meeting of all the voters in the town, which meeting also makes appropriations for the maintenance of the different departments of the town government. All judges in the commonwealth are appointed by the governor with the advice and consent of the council, and hold their office during good behaviour. The active state militia in 1890 numbered 380 officers and 4751 enlisted men, a total of 5131. Besides this active militia all able-bodied male citizens between the ages of eighteen and forty-five, except exempt persons, are enrolled, and subject to military duty in time of exigency. The number so enrolled on 1st January 1890 was 325,185.

Popular education in Massachusetts, through the system of free public schools, is carried to a very high point. In 1888–89 there were in the cities and towns 7023 public, primary, and grammar schools, and 236 high schools. These are supported at public expense by taxation—tuition and text-books being free. Besides these there were 485 academies and private schools. The amount raised by taxation and paid for all school purposes was $7,350,604, the average attendance being 270,851. Massachusetts maintains six normal schools, and there are in the state two technical institutes and twelve colleges and universities, the latter including Harvard, Williams College, Amherst College, and Boston University and College. The savings-bank system is under state supervision. In 1889 there were 177 such banks in operation, having deposits amounting to $332,723,688; besides 93 co-operative banks or building loan associations, with assets of $1,601,639.

The leading cities of Massachusetts, with pop. in 1890, are Boston, the chief seaport and capital (446,507); Worcester (84,536), with manufactures in metals and machinery; Springfield (44,164) and Holyoke (35,526), on the Connecticut River, the centre of the paper manufacture; Fall River (74,351), Lowell (77,605), and Lawrence (44,559), devoted to cotton manufacturing; Lynn (55,684), Haverhill (27,322), and Brockton (27,278), boot and shoe centres; Salem (30,735) and New Bedford (40,705), both noted seaports of former days and now possessing extensive cotton-mills; Taunton (25,389), with varied manufactures; Gloucester (24,000), noted for its fisheries; and Cambridge (69,837), near Boston, the seat of Harvard University. The state debt, January 1, 1890, was $28,251,288, protected by a sinking fund of $21,015,939. The aggregate valuation in the cities and towns for purposes of taxation, May 1, 1889, was $2,072,170,863. Pop. (1800) 422,845; (1850) 994,514; (1880) 1,783,085; (1890) 2,233,407.

History.—The coast is supposed to have been visited by Northmen about the year 1000, but the first permanent settlement was made at Plymouth, near Cape Cod, December 22, 1620, by the company of the Pilgrim Fathers (q.v.), who were separatists from the English Church, and who sailed from Plymouth, England, in the ship *Mayflower*. This settlement became the nucleus of the Plymouth colony. In 1628 a company of Puritans under Endicott settled at Salem upon the coast farther north, and, together with settlements at Boston, Lynn, and elsewhere, became the Massachusetts Bay Colony. The union of these two colonies was accomplished under a new charter granted in 1692. Under this last charter the governor, lieutenant-governor, and secretary were appointed by the king. Prior to this none but the Puritan forms of religion had been permitted in the colony of Massachusetts, and its history had been marked by bitter intolerance and cruel persecutions. Now a system was adopted under which the majority of each town or parish chose the minister, who was maintained by the taxes paid by all alike. No consideration was shown to the minorities, and the old Puritan establishment was virtually continued nearly everywhere. The last vestiges of this union between church and state were not swept away until 1833.

During the early years the colonists suffered great privations from the rigours of the climate, and they were also subjected to troubles with the Indians. They were, however, a hardy and industrious race, and gradually grew in numbers and prosperity. They were involved in the difficulties between England and France in the New World, and in the expeditions against the French in Canada, especially at the first siege of Louisburg (q.v.), the citizen soldiers of Massachusetts performed effective service. After the war of the revolution, begun in Massachusetts in 1776 with the battles at Lexington and Bunker Hill, the colony became one of the original thirteen states of the Union, under the name of the commonwealth of Massachusetts. The second half of the 19th century has witnessed the gradual change of Massachusetts from a purely agricultural to a manufacturing state, until now a majority of the whole population is urban; not, however, because less land is cultivated, but simply because manufactures have increased much faster than agriculture. See J. S. Barry, *History of Massachusetts* (3 vols. 1855–57).

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Massafra, a town of the Italian province of Lecce, 11 miles by rail NW. of Taranto. The 9463 inhabitants grow olives, wine, and fruits.

Massage (Fr., 'kneading') is the term used in medicine to denote a system of treatment in which the manipulation and exercise of parts ('passive movement') are employed for the relief of morbid conditions. The term is used in an elastic sense, and comprises a variety of forms of treatment extending in the one direction towards the composite gymnastic exercises of Swedish origin (see SLOYD), so useful in favouring a sound physical development in children, and in the other towards the jerking and wrenching movements, empirically employed, and familiar in Great Britain under the name of 'bonesetting.' For the most part, however, massage corresponds to the application of kneading, stroking, and rubbing, separately or combined with each other.

Massage is as old as, if not older than, any other form of medical treatment. Hippocrates (600 B.C.), the 'Father of Medicine,' has left in his writings a description of its application and uses; observing that 'it loosens stiff joints and gives tone and strength to those which are relaxed;' further, that 'it must be applied with soft hands and in all cases delicately.' In the Greek world, and also in the Roman (cf. Lytton's *Last Days of Pompeii*), massage formed a necessary complement to the toilet of the bath; but, apart from the slaves who were specially trained for such duties, there appears to have been a regular profession of 'rubbers' competing with, and often superseding the physicians of the period. The Chinese and the early races of India seem to have known the value of massage from a remote period, for it is frequently referred to in the ancient writings of both peoples. During the dark ages this method of treatment seems to have fallen into disrepute in Europe; and it is only within the later half of the 19th century that its practice has been thoroughly re-established, and that on a scientific basis. It is largely due to Dr Mezger, a physician of Amsterdam, that massage has become once more a systematised mode of medical treatment. He began to treat sprains by this method in 1853, and from that time to the present his system has attracted much attention, and has spread widely over the European and American continents.

Two chief methods of application are employed: (1) Stroking, or rubbing with a gliding movement, affecting chiefly the superficial parts (*effleurage*). (2) Pressing, tapping, or kneading, affecting chiefly the deeper tissues, and in one locality at a time (*tapotement*). To these may be added an important combination of the two, viz.: (3) Friction with kneading (*pétrissage*), in which the tissues are at the same time rubbed longitudinally and squeezed laterally, both superficial and deeper tissues being thereby equally affected. In applying these methods the hand and fingers of the manipulator alone are used. As a rule, if the hands are soft and moist no emollient substance is required, and the best effects are produced without such aid. In all cases the movements follow a direction towards the trunk. In stroking (*effleurage*) the finger-tips pass first lightly over the affected surface, followed by the outspread palm of the hand, which exerts a slightly firmer pressure. In tapping (*tapotement*) the finger-tips, the knuckles, or the edges of the palm are firmly thrust against the affected areas, so as to act chiefly on the deeper tissues, by compressing them firmly against the bony framework of the part. In friction (*pétrissage*) the tissues are grasped and raised between the fingers and thumbs, and slightly compressed laterally as well as longitudinally as the manipulator's hands pass upwards over the part. The total time taken up in the application of one of these methods, or in a combination of any of them, should not exceed twenty minutes, and as a rule one such *séance* is sufficient in the twenty-four hours.

The chief vital effects produced by massage are soothing of pain by reduction of the sensibility of the nerves of the skin; an acceleration in the circulation both of blood and lymph in the parts operated on; and, as a result of this, increased nutrition of healthy tissues and accelerated removal of morbid products. General and local applications of massage are practised in medicine; the former when some general corporeal effect is aimed at, as in nervous emaciation, narcotic poisoning, and in the treatment of the apparently drowned; the latter, in local injuries, as sprains and bruises, and in local manifestations of constitutional conditions, as rheumatic joint affections, neuralgia, tic, and sciatica. In purely local joint and bone diseases it is, however, as a rule inapplicable and likely to do harm. See D. Graham, *Massage: History and Application* (New York, 1889).

Massa'getæ, a wild and warlike people, who inhabited the broad steppes on the north-east of the Caspian Sea, to the northward of the river Araxes or Jaxartes. Herodotus says that they had a community of wives; that they sacrificed and devoured their aged people; that they worshipped the sun, and offered horses to him; that they lived on the milk and flesh of their herds, and on fish, and fought on horseback and on foot with lance, bow, and double-edged axe. Cyrus is said to have lost his life in fighting against them, 530 B.C.

Masséna, ANDRÉ, Duke of Rivoli, Prince of Essling, and the greatest of all Napoleon's marshals, was born at Nice, it is said of Jewish origin, 6th May 1758. He began life as a cabin-boy, and served fourteen years in the Sardinian army, but left it because his plebeian birth precluded him from promotion. Early in the French Revolution he joined a battalion of volunteers, and rose rapidly in rank, becoming in December 1793 a general of division. He distinguished himself greatly in the campaigns in Upper Italy, especially at Saorgio (1794), Loano (1795), and Rivoli (1797), and earned from his chief his famous surname of *enfant chéri de la victoire*. After Jourdan's defeat at Stockach (25th March 1799) the chief command of the army in Switzerland devolved upon him in circumstances of great difficulty, but he kept his ground against the Archduke Charles, and finally by his crushing victory over Suvaroff's Russians at Zurich (25th September 1799) freed France from the danger of invasion. In 1804 Napoleon made him a marshal of the empire, and next gave him the command of the army of Italy. He kept the Archduke Charles in check, crushed him at Caldiero, and overran Naples. In 1807, after the battle of Eylau, he commanded the right wing of the French army, and at the end of the campaign was created Duke of Rivoli. During the peace he lost his left eye by accident at a hunting-party. In the campaign of 1809 against Austria he commanded on the right bank of the Danube, and covered himself with glory at Landshut, Eckmühl, and Ebersberg-on-Traun. On the second day of the battle at Aspern or Essling (22d May), with the most conspicuous bravery he covered the army in its crossing the Danube, and alone saved it from destruction, earning for himself the title of Prince of Essling. In 1810 he was sent to Spain to drive the English into the sea, and he compelled Wellington to fall back upon his impregnable lines at Torres Vedras. Finding it impossible to obtain any advantage, and harassed by lack of supplies, he

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made a masterly retreat, to find himself recalled with ignominy by his imperious master. His failure he himself ascribed to the disobedience of his subordinates, Ney and Junot. He offered his services, however, again, when Napoleon was preparing for the Russian campaign, but was entrusted only with the command in Provence, and in this position he remained till the Restoration, when he gave in his adhesion to the Bourbons, and was made a peer. On Napoleon's return from Elba he invited Masséna to follow him, but received no response. He refused to sit on Ney's court-martial, and denounced the competence of the court. He died 4th April 1817, and was buried in Père-la-Chaise with the one word *Masséna* on his tombstone. In tactics Masséna resembled his master in quickness and fertility in resource. He was brave and indefatigable in the field, but as extortionate as a Roman prætor. His *Mémoires* were edited by General Koch (7 vols. 1849–50), and there is a Life by Toselli (1869).

Massenet, JULES, French musical composer, was born at Montaud, near St Étienne, on 12th May 1842, and after a most successful career as a student at the Paris conservatory, chiefly under Ambrose Thomas, he was appointed professor of Composition at that institution in 1878. He won the *Prix de Rome* in 1863, was favourably received as the composer of meritorious orchestral works and a comic opera, *La Grande Tante* (1867), before the Franco-Prussian war, and in 1873 took his place amongst the foremost of the younger composers of France, his fame being established by the comic opera *Don César de Bazan* (1872), the classical opera *Les Erinnyes* (1873), and the oratorio *Marie Madeleine* (1873). These were followed by the oratorios *Eve* (1875) and *Vierge* (1879), the great operas *Roi de Lahore* (1877), *Hérodiade* (1881), *Manon Lescaut* (1884), and *Esclarmonde* (1889), besides numerous pianoforte and orchestral pieces.

Massillon, JEAN BAPTISTE, one of the most distinguished of modern orators, was born at Hyères in Provence, 24th June 1663. His father was a notary and had designed him for his own profession, but at length in 1681 the boy obtained permission to follow his vocation and enter the congregation of the Oratory. Later he subjected himself to a more rigorous discipline in the abbey of Sept-Fonts. His preaching power was soon discovered, and his funeral oration on M. Villars, the Archbishop of Vienne, established his fame, and led to his being summoned by Cardinal de Noailles to Paris, where he first had the opportunity of hearing Bourdaloue, whose style and manner powerfully influenced the young orator. It is said that the older preacher said when first he heard him, 'He must increase, but I must decrease.' Like Bourdaloue, he avoided the declamatory manner and theatrical action then popular in the French pulpit; and the earnest impressiveness of his face and voice more than counterbalanced the lack of such adventitious aids to effect. He gave a remarkable series of lectures in the seminary of St Magloire, and first preached before Louis XIV. in Advent 1699. It was to him that the king said, 'I have heard great orators in my chapel and have felt satisfied with them, but every time I have heard you I have felt dissatisfied with myself'—a saying which well expresses the characteristics of the fearless eloquence of this great orator, who, more than any of his contemporaries, was able to lay bare the secret springs of human action, and to use the feelings and the passions of his audience as arms against themselves. He was again appointed to preach the Lent at Versailles in 1704; but although the king was again equally warm in his admiration, Massillon was never afterwards invited to preach in his presence. In 1717 Massillon was named Bishop of Clermont, and next year preached before the young king, Louis XV., his celebrated *Petit Carême*—a series of ten short Lenten sermons. It was not till 1719 that he was consecrated Bishop of Clermont, in which year also he was elected a member of the Academy; and in 1723 he preached the funeral oration of the Duchess of Orleans, his last public discourse in Paris. From this time he lived almost entirely for his diocese, where his charity and gentleness gained him the love of all. He died of apoplexy, 28th September 1742. Bossuet and Bourdaloue contest with Massillon the palm of oratory, yet it is not too much to say that he was a greater preacher than either. By French critics he has been termed the Racine of the pulpit, and the name may pass as regards the purity and elegance of Massillon's language, though it takes no count of his characteristic directness and vigour. For impassioned denunciation of vice marks his preaching, no less than gentle persuasiveness to virtue, although it remains true that he is greatest in the latter. His sermons on the Prodigal Son, on the Deaths of the Just and the Unjust, for Christmas, and for the Fourth Sunday in Advent may be named among his masterpieces.

His sermons were collected by his nephew (15 vols. 1745–48); later editions are those of Renouard (1810), the Abbé Guillon (16 vols. 1828), and Blampignon (4 vols. 1886). See Sainte-Beuve's *Causeries du Lundi*, vol. ix.

Massinger, PHILIP, dramatist, baptised at St Thomas's, Salisbury, 24th November 1583, was a son of Arthur Massinger, a retainer of the Earl of Pembroke. In a dedicatory epistle to Philip Herbert, Earl of Montgomery, prefixed to *The Bondman* (1624), he mentions that his father spent many years in the service of the Herbert family, 'and died a servant to it.' On 14th May 1602 Massinger entered St Alban's Hall, Oxford, and he left the university without a degree in 1606. Gifford supposed that during his residence at Oxford he became a convert to the Roman Catholic faith; and the plays afford some evidence in support of this view.

Massinger was writing for the theatre during the lifetime of the stage-manager Philip Henslowe, who died in January 1615–16. At Dulwich College is preserved an undated letter (*circa* 1613–14) to Henslowe from Nathaniel Field, Daborn, and Massinger. The three playwrights were in financial distress and begged for an advance of five pounds ('without which we cannot be bailed') on a play which they were preparing. Their petition was granted. On 4th July 1615 Daborn and Massinger borrowed from Henslowe the sum of three pounds. In later years Massinger wrote many plays singlehanded; but much of his work is mixed up with the work of other men, particularly Fletcher. His friend Sir Aston Cokayne, in an 'Epitaph on Mr John Fletcher and Mr Philip Massinger,' expressly states, 'Playes they did write together, were great friends.' Beaumont had a share in only a few of the plays ascribed to 'Beaumont and Fletcher;' but Massinger and Fletcher continued to work together long after Beaumont's death. Fletcher was buried in St Saviour's Church, Southwark, 29th August 1625; and Massinger was laid in the same grave, 18th March 1638–39.

Probably the earliest of Massinger's extant plays is *The Unnatural Combat*, a repulsive tragedy, printed in 1639. The first in order of publication is *The Virgin Martyr* (1622), partly written by Dekker, who doubtless contributed the beautiful colloquy between Dorothea and Angelo (II. i.). In 1623 was published *The Duke of Milan*, a fine tragedy, but too rhetorical. *The Bondman*, *The*

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Renegado, and *The Parliament of Love* were licensed for the stage between 3d December 1623 and 3d November 1624. In many of his plays Massinger introduces political allusions, and more than once his temerity was rebuked by Sir Henry Herbert, Master of the Revels. *The Bondman* contains some outspoken criticism on the feeble condition of the navy. There is considerable resemblance between *The Parliament of Love*, which was first printed by Gifford from a mutilated MS., and *A Cure for a Cuckold*, ascribed to Webster and Rowley (but not improbably the work of Massinger and Rowley). Of *The Roman Actor*, produced in 1626 and printed in 1629, Massinger declares 'I ever held it the most perfect birth of my Minerva.' It abounds in eloquent declamation, but is somewhat stiff. *The Great Duke of Florence*, produced on 5th July 1627, has a delightful love-story. Massinger's female characters are usually unattractive and sometimes odious; but in this comedy he has drawn a charming heroine—a modest, frank, warm-hearted girl. *The Maid of Honour*, published in 1632 and probably produced in 1628, is—like *The Bondman*—full of political allusions (as Professor S. R. Gardiner has shown, *Contemporary Review*, August 1876). *The Picture*, licensed for the stage 8th June 1629, and printed in 1630, has an improbable plot, but is well written. *The Emperor of the East*, produced in 1631 and printed in 1632, bears some resemblance to *The Duke of Milan*. In both plays a man of passionate, ungovernable temper unjustly suspects his wife of infidelity; but *The Emperor of the East* ends happily. Nathaniel Field joined Massinger in writing the fine tragedy *The Fatal Dowry*, printed in 1632, but produced some years earlier. From this play Rowe's once-famous *Fair Penitent* was largely drawn, without acknowledgment. *The City Madam*, licensed for the stage in 1632, and *A New Way to pay Old Debts*, printed in 1633, are Massinger's most masterly comedies. There is no warmth or geniality about them; but, as satirical studies, they have Ben Jonson's strength without his ponderousness. *A New Way* has held the stage down to recent times. Sir Giles Mompesson, the infamous extortioner, is supposed to have been the original of Sir Giles Overreach, a character which has been personated by many famous actors. *The Guardian* (1633), *A Very Woman* (1634), and *The Bashful Lover* (1636) were printed together, 1 vol., in 1655. The most interesting is *A Very Woman*, which is Fletcher's play *The Woman's Plot* revised by Massinger. *Believe as You List*, produced on 7th May 1631, and first printed from MS. in 1844, relates to the adventurer who at the beginning of the 17th century claimed to be the Don Sebastian killed in 1578 at the battle of Alcazar. Massinger represents the claimant as a model of kingly dignity, worthy to rank with Ford's Perkin Warbeck. Though *Believe as You List* has survived, several other MS. plays of Massinger were destroyed by Warburton's cook towards the close of the 18th century. The powerful and stately *Tragedy of Sir John Van Olden Barnavelt*, produced in August 1619, written by Massinger and Fletcher, was printed for the first time from MS. in vol. ii. of Bullen's *Old Plays* (First Series), and was reprinted in Holland. In spite of the Lord Mayor's prohibition it was acted with applause by the king's men.

Massinger showed great care and skill in the construction of his plays. Other playwrights affect us more powerfully, but few can compare with Massinger for general excellence. He was not only a sincere, high-minded artist, but a keen observer of state affairs. Hence his writings have a historical as well as a literary interest. Some of his plays are (as Coleridge said) as interesting as a novel; others are as solid as a treatise on political philosophy. His versification is peculiar. He seems to have taken the metrical style of Shakespeare's latest plays as his model; but his verse, though it is fluent and flexible, lacks the music and magic of Shakespeare's. No writer repeats himself more frequently than Massinger; he had a set of favourite phrases that he constantly introduces. This trick of repetition, joined to his metrical mannerisms, helps us materially to distinguish his work from Fletcher's. Mr Robert Boyle (in papers contributed to *Englische Studien*) and Mr F. G. Fleay have discussed the difficult question how far Massinger was concerned in the authorship of plays that pass under the name of 'Beaumont and Fletcher.'

Massinger's plays were edited by William Gifford in 1808, 4 vols.; 2d ed. 1816. There is also an edition in the volume (from the text of Gifford) by the late Lieutenant-colonel Cunningham. Two volumes of selected plays, edited by Mr Arthur Symons, are included in the 'Mermaid' series. See S. R. Gardiner, 'The Political Element in Massinger' in *Cont. Rev.* 1876.

Masson, DAVID, an eminent Scottish author, born at Aberdeen, 2d December 1822, educated at Marischal College in that city, and at the university of Edinburgh. At nineteen he became editor of a Scotch provincial paper, and later joined the literary staff of W. & R. Chambers. In 1847 he settled in London, writing for the reviews, the *Encyclopædia Britannica*, and the *English Encyclopædia*. In 1852 he succeeded Clough in the chair of English Literature in University College, and held it till his appointment in 1865 as professor of Rhetoric and English Literature in the university of Edinburgh. Masson edited *Macmillan's Magazine* from 1859 to 1868. His first published work was his *Essays, Biographical and Critical* (1856), reprinted with later essays in 3 vols. (1874–76) entitled respectively *Wordsworth, Shelley, and Keats; The Three Devils—Luther's, Milton's, and Goethe's;* and *Chatterton, a Story of the Year 1770*. His great work is his ponderous *Life of John Milton, narrated in connection with the Political, Ecclesiastical, and Literary History of his Time* (6 vols. 1859–80), the most complete biography of any Englishman, and of great value for the contemporary history. Other works are *British Novelists and their Styles* (1859); *Recent British Philosophy* (1865); *Drummond of Hawthornden: the Story of his Life and Writings* (1873); the 'Cambridge' edition of *Milton*, with introductions, notes, and an essay on Milton's English (3 vols. 1874; new ed. 1890), the 'Golden Treasury' edition (2 vols. 1874), and the 'Globe' edition (1877). Later works are an excellent study on *De Quincey* (1878) in the 'English Men of Letters' series, and a new edition of De Quincey's works in 14 volumes (1889–91). He was Rhind lecturer in 1885, and after 1879 he edited the *Register* of the Privy-council of Scotland, contributing the introductions to the volumes.

Massorah, or MASORA ('tradition'), a collection of critical notes on the text of the Old Testament, its divisions, accents, vowels, grammatical forms, and letters (see HEBREW LANGUAGE, Vol. V. p. 614). There can hardly be a doubt that the Massorah, like the Halacha and Haggada, was the work, not of one age or century, but of many ages and centuries, as, indeed, we find in ancient authorities mention made of different systems of accentuation used in Tiberias, Babylon (Assyria), and Palestine. It was in Tiberias also that the Massorah was first committed to writing between the 6th and 9th century A.D. Monographs, memorial verses, and glosses on the margins of the text seem to have been the earliest forms of the written Massorah, which gradually expanded into one of the most elaborate and minute systems, laid down in the

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'Great Massorah' (about the 11th century), whence an extract was made known under the name of the 'Small Massorah.' The final arrangement of the Massorah, which was first printed in Bomberg's Rabbinical Bible (Venice, 1525), is due to Jacob-ben-Chayim of Tunis, and to Felix Pratensis. The language of the Massoretic writers is Chaldee, and the obscure abbreviations, contractions, symbolical signs, &c., with which the work abounds, render its study exceedingly hard. Nor are all its dicta of the same sterling value; they are not only sometimes utterly superfluous, but downright erroneous. See Dr Ginsburg's great work on the Massorah (4 vols. folio, 1880–86).

Massowah, or MASSAUA, a town built on a coral island off the west coast of the Red Sea, in 15° 36′ N. lat., 39° 28′ E. long. It was seized by Turkey in 1557, but in 1866 given by her to Egypt; and in 1885 it was occupied by Italy. The island is only about 1¼ mile in circumference, and is connected with the mainland by a causeway, 1610 yards in length, resting on an intervening island. The pop. number 16,350, of whom 15,000 are natives, 500 Italians, 700 Greeks, and 100 Banyans. Fishing for pearls and mother-of-pearl is the principal industry, but there is also a little fishing and weaving of palm-fibres. Next after Suâkin, Massowah is the most important harbour and trading-port on the African coast of the Red Sea. Its imports (cottons, chemical products, animals, grain and flour, groceries, spirits, hides, and timber) are valued at £412,000 annually, and its exports (pearls and mother-of-pearl) at £32,000. Skins, gums, ivory, wax, and gold are also exported, but their annual value cannot be stated. Massowah is very hot (mean of the year, 85·8° F.) and very unhealthy; nevertheless the advantages of its site have led the Italians to make it their headquarters in this part of Africa. Pop. of the *district* of Massowah, 65,500.

Master, in the royal navy, was an officer ranking with, but junior to, lieutenants, and charged with the details of sailing the vessel, under the general orders of the captain. In recent years the title has been changed to 'navigating lieutenant.' In the merchant navy the master of a vessel, usually, by courtesy, denominated the captain, is the officer commanding her.

Master and Servant. The relation of master and servant is constituted in Great Britain entirely by contract; for, there being no status of slavery recognised in law, one person can only serve another with his or her own free consent. Being a mere contract, it may, like other contracts, be broken at will, subject only to the usual consequence, that the party in the wrong is liable to pay damages for the breach. The engagement or hiring of a servant may be either verbal or in writing; but if the engagement is for more than one year it must be in writing. A servant undertakes to have competent skill for the duties of the service, and is bound to use due diligence, and to conduct himself respectfully. He is bound to obey all lawful orders of his master during the engagement, if they are within the scope of the particular service for which he is engaged. Thus, a coachman is not bound to do the duties of a cook, and *vice versâ*. Every servant is bound to take due care of his master's property, and is liable to an action at the suit of his master for gross negligence, and also for fraud and misfeasance. A master is not entitled to chastise a servant, whatever the age of the servant may be, though, in the case of an apprentice under age, a moderate chastisement is justifiable. The grounds on which a servant may be lawfully discharged are wilful disobedience, gross immorality, habitual negligence, and incompetence. If any person entice away a servant, and thereby cause loss to the master, the latter may sue such person for the injury. If the servant is a female, and is seduced, and thereby is unable to continue her service, the master may also bring an action against the seducer for any loss of service caused thereby; and on the same principle a master may bring an action against a third party who causes personal injury to the servant. In the case of the bankruptcy of the master a preference is given to the servant's wages if due and unpaid; but this extends only to two months' wages, and the servant is an ordinary creditor for the balance beyond that sum. The death of the master is a discharge of the contract. When a servant falls sick the master is not bound to provide medical attendance whether the servant lives under his roof or not; but, as in such cases a doctor is often sent for by the master without any understanding between the parties, the master is frequently made liable on the ground that the doctor was sent for by and gave credit to the master. As a general rule, the servant takes the risk of all the ordinary accidents attending the particular service; but under the Employers' Liability Act of 1880 a workman, or, if the injury results in death, his legal personal representatives, shall have the same right of compensation and remedies against the employer as if he had not been in the employer's service, in the following cases: If the workman suffer injury by reason of defect in the employer's works or machinery or plant; by the negligence of any other superior workman; by the negligence of any other servant in charge of locomotives or signal-points (see LIABILITY OF EMPLOYERS). Where a servant injures a third party the rule remains that the master is liable, if the servant at the time was acting within the scope of the master's orders, expressed or implied. Hence, if a coachman carelessly run down a person on the highway, or do injury to another, the master is liable; but if the coachman is driving the master's carriage without or contrary to the orders of the master, the servant alone is liable. So the master is not in any way responsible for the crimes or criminal offences committed by his servant; yet sometimes he is involved in fines. The above are the general rules as regards servants generally; but in England there is a distinction in many instances observed between domestic servants and other servants. The leading distinction is that, if nothing is said as to the length of service, it is presumed that the service can be terminated at any time, on giving a month's notice on either side, or in case of the discharge of a domestic servant without notice, then on payment of a month's wages. It is often popularly thought that a domestic servant cannot be turned out of the master's house at a moment's notice, even on paying a month's wages, but this can always be done, with or without cause. If a yearly servant wrongfully quit his master's service he forfeits all claim to wages for the part of the year during which he has served. In case of discharge without cause the servant is entitled to a month's wages, but not board-wages. The master's responsibility as to giving a Character to a Servant is the subject of an article; see also EARNEST.

In general, a servant, if he refuse to enter the service, or leave it without cause, is merely liable to an action of damages for breach of contract, which is no remedy at all, as few servants could pay the costs of a suit. As this conduct, however, might often cause great hardship to masters, especially where they are employed in trade or manufactures, statutes have been passed which give a power to justices of the peace to compel the servant to remain in the service until he give the legal notice to leave. This was formerly done by

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punishing by imprisonment the servant who left the service without just cause. This law, complained of by workmen as one-sided, was modified by statutes, the regulations of which are now embodied in the Employers and Workmen Act, 1875, and the Conspiracy and Protection of Property Act, 1875. These acts give the county courts special powers with regard to the settlement of disputes between employers and workmen, and provide that a combination of two or more persons cannot be indicted for conspiracy to do what would not be criminal if done by one only. Workmen employed by gas and water companies are liable on breach of their contract to fine or imprisonment. The law of the United States does not recognise a distinction between domestic and other servants.

In *Scotland* the law as to master and servant differs from the above in several particulars, of which the following are the most important. With regard to domestic servants, in towns, if nothing is said, then the hiring is for half a year, and cannot be put an end to without forty days' warning before the end of the half year; and if the servant is dismissed without just cause, he or she can claim not only wages but board-wages till the end of the term. In case of the master's death the servant can claim wages for the whole of the current term, but is bound in that case to serve the executors, or look out for another situation. In case of the master's bankruptcy the servant is a privileged debtor for the wages of the current term. In most other respects the law as to servants is the same as in England. See C. M. Smith's *Law of Master and Servant* (4th ed. 1885).

Master of Arts (abbreviated M.A., and sometimes, particularly in America, A.M.) is a degree conferred by universities and some colleges. In the universities of England this title follows that of Bachelor (q.v.). The dignity of Master (*Magister artium liberalium*) was held in high esteem in the middle ages. In Germany it is now obsolete, having been superseded by that of doctor. A Master has the right to vote in congregation or convocation at Oxford, and in the senate at Cambridge, and consequently enjoys the university franchise; in the Scottish universities all Masters are members of the General Council, and as such elect the parliamentary representatives for the university. See DEGREES.

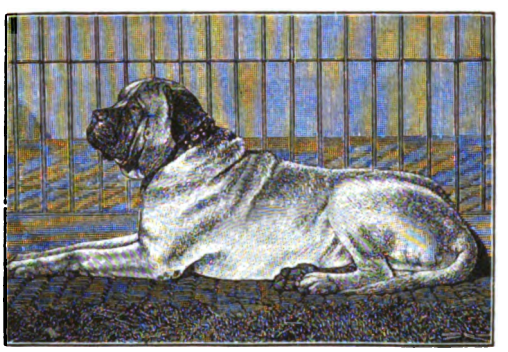
Master of Ceremonies, of the Rolls, &c. See CEREMONIES, ROLLS, &c.

Masterwort (*Peucedanum Ostruthium*), a perennial herb of the natural order Umbelliferæ. It is a native of the north of Europe and the north of America, and is found in moist pastures in some parts of Britain, but apparently naturalised rather than indigenous, its root having formerly been much cultivated as a potherb, and held in great repute as a stomachic, sudorific, diuretic, &c. The root has a pungent taste, causes a flow of saliva and a sensation of warmth in the mouth, and often affords relief in toothache. *Astrantia major*, a herb belonging to the same natural order and having similar properties, is also named Masterwort.

Mastic, a species of gum-resin yielded by the Mastic or Lentisk tree (*Pistacia lentiscus*, natural order Terebinthaceæ). It oozes from cuts made in the bark, and hardens on the stem in small round tear-like lumps of a light straw colour, or, if not collected in time, it falls on the ground; in the latter state it acquires some impurities, and is consequently less valuable. The chief use of this gum-resin is in making the almost colourless varnish for varnishing prints, maps, drawings, &c. It is also used by dentists for stopping hollow teeth, and was formerly employed in medicine. It is imported in small quantities, chiefly from the Morocco coast, but some is brought from the south of Europe and the Ægean.—The name of mastic is also given to oleaginous cements, composed of about 7 parts of litharge and 93 of burned clay, reduced to fine powder, made into a paste with linseed-oil.

Mastiff. The characteristics of the mastiff group of dogs are very marked and constant. One variety of the breed has been known from ancient times as the English, another as the Bordeaux or mastiff of Gaul. These may be classed as the European, while another kind is the Asiatic, of which the Tibetan is perhaps the most typical. No group of domestic dogs has more appearance of being an original and distinct species, although the English mastiff has been crossed and recrossed from time to time, principally with the object of increasing the size; and, while the blood of the Asiatic variety was very probably introduced at an early date, subsequently crosses with the Alpine mastiff, the St Bernard, the boarhound, and the bulldog have undoubtedly been introduced, and the modern English mastiff must be regarded as a composite breed.

The English mastiff is thick-set and powerful, with a large head and broad, short, truncated muzzle, large, thick, pendulous lips, ears formerly often semi-erect, now hanging and of moderate size, smooth-coated, with frequently a full but not bushy tail. This variety formerly averaged from 25 to 28



English Mastiff ('Beaufort,' 1887).

inches at shoulder, but during the last half of the 19th century, owing to repeated crossing and selection, an average of from 30 to 32 inches at shoulder has been obtained, perhaps somewhat to the loss of muscular power and activity. The colours are all shades of fawn, tan, and black, with and without mixture of white. Formerly red and brindle were the commonest colours, but owing to selection fawn in all shades is now the most prevalent, with the muzzle, ears, and other extremities shaded with black or darker markings.

The mastiff was formerly very courageous, and would readily attack the lion or bear; now it is chiefly valued for exhibition purposes, and £70 is not an outside price for a really typical specimen. As a companion or watch-dog no other variety equals it, for, while faithfully protecting the property entrusted to it (at times with marvellous sagacity and discrimination), it has the additional merit of generally refraining from the infliction of personal injury on the invader, unless aggravatingly provoked. It becomes ardently and instinctively attached to its master, although not demonstratively affectionate. It has an excellent nose, but is of little or no use for sporting purposes, and dull at learning any kind of tricks.

The mastiff of Tibet was larger than the old English, but is smaller than the modern English

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mastiff, averaging from 27 to 30 inches at shoulder. The head is longer, narrower, and more elevated at the back or cone, the skin much looser, and forming a fold from the eyebrows which descends to the lips, these being more pendulous than in the English variety, and partaking more of the character of the bloodhound. The hair is rough and dense, the tail bushy and curled generally over the back, colour mostly black, with tan or fawn shadings over the eyes, on the paws, and under the belly; but fawn-coloured specimens are not uncommon. Dogs of this kind are found in Nepal, Bhutan, Tibet, Mongolia, and probably northward through Russia and Siberia, in a state of more or less purity; and dogs presenting the characteristics of the Asiatic mastiff and of vast size appear to have existed since the days of the Assyrian empire, 650 B.C. See the Rev. M. B. Wynn's *History of the Mastiff* (1886).

Mastodon, a genus of extinct elephants, whose remains are found in Europe, Asia, and America, in Miocene, Pliocene, and Pleistocene strata. They equalled or excelled their modern relatives in size. The name mastodon refers to the mammillary cusps or teat-like prominences on the molar teeth. See ELEPHANT.

Masûdi, ABUL HASSAN ALI, an Arab traveller and author (died 957), was born at Bagdad about the end of the 9th century, and spent great part of his life in travel, visiting Egypt, Palestine, the Caspian shores, India, Ceylon, Madagascar, and perhaps even China. His chief works are the *Annals*, of which an abridgment, *The Meadows of Gold*, was printed with a French translation by Meynard in 1861-77 (one vol. of an English translation by Springer in 1841), and the *Indicator*.

Masulipatam', the principal seaport of Kistna district in the presidency of Madras, lies 215 miles N. of Madras city. Vessels anchor 5 miles from shore. Total value of trade £250,000 to £300,000 per annum. Here the English established an agency in 1611, and after 1628 it became the centre of their trade in those parts. Since 1841 the town has been an active missionary centre. In 1864 a storm wave swept over it and destroyed 30,000 lives. Pop. (1881) 35,056, many of whom weave cottons.

Matabeleland, a country stretching northwards from the South African Republic or Transvaal towards the Zambesi, and having Khama's territory on the south-west. It measures about 180 miles from north to south and 150 from east to west, and embraces the watershed between the river-systems of the Zambesi and the Limpopo. When the despotic Chaka ruled over the Zulus (q.v.), a section of the nation under a rival chief, Mosilikatze, rebelled and moved off towards the north. After remaining for a while in what is now the Transvaal, they finally settled in 1840 beyond the granitic Matoppo Mountains, subduing and almost exterminating the peoples they found there—the Mashona, the Makalaka, and the Banyai. The Matabele, who still preserve the warlike habits of the Zulu race, are simply a large standing army, ruled despotically by one chief, at present Lobengula, the son of Mosilikatze. They are divided into four territorial divisions, and number in all some 200,000 persons, of whom 15,000 are fighting men, distributed in regimental kraals. They periodically carry on savage forays upon their weaker neighbours, slay the men, and incorporate the women and children into their community. The king holds in trust for the entire body of fighting-men and their dependents large herds of cattle; the women grow mealies and Kaffir corn. There are no industries. Quartz reefs rich in gold exist in various parts of the country, and mines were worked at Tati, in the south-west, until the more prosperous opening of the diamond mines farther south caused them to be abandoned. The king's kraal is called Gubuluwayo, and, like most kraals, is generally moved after every ten years. Christian missionaries settled at Inyati (Emhlangen) in 1859, but their activity is greatly crippled by the all-powerful belief in witchcraft which reigns amongst the people. In 1890 the country was given to the British South Africa Company, and declared to be British territory.

See Selous in *Proc. Roy. Geog. Soc.* (1881; and 1888 for map), *Fortnightly Review* (1889), and *A Hunter's Wanderings in Africa* (1881); Government Blue-book, C—4643 (1886), for reports by Lieutenants Maund and Haynes; works by Dr Holub and by Mauch; Baines, *Gold Regions of South-east Africa* (1877); Montagu Kerr, *The Far Interior* (1886); and Oates, *Matabeleland* (2d ed. 1889).

Matador (Span., 'slayer'). See BULL-FIGHT.

Matamo'ros, a river-port of Mexico, lies opposite Brownsville, Texas, on the south bank of the Rio Grande, 40 miles from its mouth in the Gulf of Mexico. With the other Mexican towns on the river it has formed a free-trade league since 1861. The Rio Grande is navigable for small vessels as far as Reynosa, and a railway from Matamoros extends beyond this point to San Miguel (75 miles). Pop. 13,740.—Another Matamoros is in the Mexican state Puebla, 4160 feet above sea-level. It has coal-mines and a pop. of 13,408.

Matanzas, a fortified town and seaport on the north coast of Cuba, 55 miles by rail E. of Havana, to which city alone it is second in size and wealth. It is a well-built town, situated in an exceedingly rich and fertile district, has an excellent harbour, a large trade in sugar, molasses, rum, and cigars, and contains several distilleries and iron-foundries. Pop. 87,760.

Matapan, CAPE, the southernmost point, bold and precipitous, of the Morea in Greece, 36° 22′ N. lat.

Mataro, a seaport of Spain, 17 miles by rail NE. of Barcelona, has cotton, sailcloth, glass, and machinery factories, iron-foundries, and shipbuilding-yards, besides a marine school. Pop. 17,405.

Matches, the name now given to splints of wood tipped with some composition (often containing phosphorus) to produce a light by friction. These came into general use about the year 1834. Before that the common light producer was the flint and steel along with a tinder-box. The tinder (charred cotton) was set on fire by sparks from the flint and steel, but did not burst into flame. This was obtained by touching the burning tinder with a spunk or strip of wood tipped with sulphur. Perhaps the most primitive way of producing a light is by rubbing two pieces of wood together, or by rapidly twirling one piece of wood into a hole or socket in another piece, touchwood being ignited by either process when sufficient heat is raised. These methods of obtaining fire by the friction of two bits of wood are in use by some savage races (see FIRE). Among other devices formerly employed for the same purpose were a lens to concentrate the sun's rays on some inflammable substance; an arrangement (Döbereiner's lamp) for producing and kindling a jet of hydrogen gas by making it play on spongy platinum; the *oxymuriate match*, consisting of a splint tipped with a mixture of chlorate of potash and sugar, which took fire on contact with sulphuric acid; and the *lucifer match*, which was tipped with a paste containing chlorate of potash and sulphide of antimony that ignited when drawn across sand-paper. This original lucifer match required to be rubbed with a good deal of pressure to produce a light, and as it gave off

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sparks of kindled matter it was not free of danger. The introduction of phosphorus in 1834 was a great improvement.

The chief operations in the manufacture of matches embrace (1) cutting the wood splints; (2) immersing the splints in melted paraffin; and (3) preparing the igniting composition and dipping the splints into it. There is also the making of the boxes, which, in the case of safety matches, have the phosphorus composition glued upon their sides. Pine or aspen is the wood used for the splints.

There are several kinds of splint-cutting machines. One of the simplest is a special kind of lathe for which the tree trunks to be operated upon are sawn across in pieces 14 inches long, and the bark removed. One of these pieces is the length of seven matches, and is fixed on the chuck of the lathe and cut into a continuous slice or shaving equal to a match in thickness. The principal cutting tool is fixed on the slide-rest, and as the shaving comes away it is divided into seven equal widths by cutters placed above the chief slicing tool. After the two-inch wide shavings are cut into six feet lengths, they are divided into single splints by a guillotine cutter similar to that used for cutting paper. Under favourable circumstances this machine will cut a million splints in an hour.

For the purpose of being immersed in paraffin and afterwards dipped into the igniting composition the splints are fixed into a dipping-frame. This frame consists of thin wooden laths fully two feet long, placed parallel to each other and held in position by two round iron bars passing through holes in their ends. About fifty splints, projecting equally beyond the frame, are held firmly between every two of these laths at a little distance from each other, the whole frame containing between two and three thousand. The splints are supplied to the frames by filling-machines, of which there are several kinds, chiefly of American invention. In the dipping-room, to which these filled frames are taken, the igniting composition is spread of the proper thickness on a hollow iron table kept hot by steam, and the splints dipped into it to form them into matches. The rooms where the igniting-mixture is prepared and the matches dipped are, or at least were, the most unhealthy parts of a match-factory. In former days especially, among those who worked in these rooms cases of necrosis or caries of the lower jaw occurred from the action of the phosphorus fumes. But, owing to the lessened quantity of phosphorus now used in the dipping-mixtures and improved ventilation, this disease has become rare. It never occurs at all where red or amorphous phosphorus is employed, but common phosphorus is still very largely used.

Nearly every manufacturer has his own special mixture for the dipping of matches. One published recipe gives as the ingredients for this: ½ part by weight of common phosphorus, 4 of chlorate of potash, 2 of glue, 1 of whiting, and 4 of finely-powdered glass. The proportion of phosphorus is small in this mixture. As it makes a more noiseless match, nitrate of potash is sometimes substituted for the chlorate. Other oxidising agents used instead of, or along with, these salts of potash are oxide of manganese and the red oxide or the dioxide of lead. Of course some water (slightly heated) is used in preparing dipping-mixtures. According to Gautier (*Cours de Chimie*, 1887), the igniting-mixture for ordinary matches made in France consists of 3 parts of common phosphorus, 2 of lead dioxide, 2 of sand, and 3 of gum. The same author states that safety or 'Swedish' matches are dipped in a composition of 5 parts of chlorate of potash, 2 of sulphide of antimony, and 1 of glue; and that the rubbing-surface for these is a mixture of 5 parts of amorphous phosphorus, 4 of sulphide of antimony, and 2½ of glue. It need hardly be mentioned that matches are made in enormous numbers, some large firms turning out a hundred millions daily.

Probably matches to the value of £1,500,000 are made annually in Britain. In Sweden and Norway, where of late the trade has most rapidly developed, there are some sixty factories; Jönköping alone employs some 6000 matchmakers. Germany and Austria have together as many as 450 factories. In the United States the manufacture is mainly controlled by one combination of capitalists; in France the making of matches is a government monopoly. As a contrast to present prices it may be added that in 1830 the first friction matches, the Congreves, were sold in tin boxes of fifty at half-a-crown a box, each box containing a piece of glass paper to strike the matches on.

Vestas only differ from ordinary matches in the stalks being formed of bits of stearin tapers (called wax-tapers) instead of wood splints. Vesuvians used by smokers consist of a hard wood, or sometimes a hollow glass stalk, with a bulbous head formed of some slow-burning compound, such as a mixture of charcoal, saltpetre, sand, and gum, tipped with the igniting composition of ordinary matches. 'Flamers,' also for the use of smokers, have a thick head of a flaming mixture, with either a 'wax-taper' or wood stalk.

Matchlock. See FIREARMS.

Mate is an assistant, a deputy, or a second in any work. In the navy the use of the term is now confined to petty officers, such as boatswain's-mate, gunner's-mate, &c. In the merchant-service the mates are important officers, holding functions not greatly inferior to those of lieutenants in the royal navy. The first mate ranks next to the master or captain, commands in his absence, and is immediately responsible for the state of the vessel; the second and third (and fourth in large vessels) have various analogous duties.

Maté, or PARAGUAY TEA, a substitute for tea, extensively used in South America, and almost universally through Brazil. It consists of the leaves and green shoots of certain species of Holly

Maté (*Ilex Paraguayensis*).

(q.v.), more especially *Ilex Paraguayensis*, dried and roughly ground; the leafy portion being reduced to a coarse powder, and the twigs being in a more or less broken state. The term *maté*, which has by usage attached to this material, belonged originally to the vessels in which it was infused for drinking; these were usually made of gourds or calabashes, often trained into curious forms during their growth. Into the hollow vessels thus formed

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a small quantity of the material, more properly called *Yerba de Maté*, is put, and boiling water is added; it is then handed round to those who are to partake of it, and each, being provided with a small tube about eight inches in length, with a small bulb at one end, made either of basket-work of wonderful fineness or of perforated metal, to act as a strainer and prevent the fine particles from being drawn up into the mouth, dips in this instrument, which is called a *bombilla*, and sucks up a small portion of the infusion, and passes the maté-bowl on to the next person. It is usual to drink it exceedingly hot, so much so as to be extremely unpleasant to Europeans. Its effect is much the same as tea, stimulating and restorative; and it derives this property from the presence of a large proportion of the same principle which is found in tea and coffee—viz. *Theine*. The collection and preparation of maté is a large industrial occupation in Paraguay and Brazil.

Matera, a city of the Italian province Potenza, situated 37 miles NW. of Taranto. Pop. 15,700. Here is the cathedral of the archbishopric of Acerenza and Matera. There are numerous caverns and stone-quarries in the vicinity.

Materialism is the theory of the world which professes to find in matter (monistic or philosophical materialism), or in material entities (atomistic materialism), or in material qualities and forces (scientific or physical materialism), a complete explanation of all life and existence whatsoever. Early philosophies are generally either theogonies or cosmogonies. Cosmogonies tend to postulate animated or living matter (hylozoism). Out of the earliest hylozoistic philosophemes of the Ionic school in Greece arose the atomistic materialism of Leucippus and Democritus, explaining the cosmos as an aggregation and segregation of ultimate indivisible material entities or atoms. The atomic theory of Democritus became the basis of the sensationalistic psychology and ethic of Epicurus, and was transmitted in the glowing verses of Lucretius' great didactic poem, *De Rerum Naturâ*, on to the later Roman period. Materialism as a basis for scientific research we find revived in history wherever a movement arose in favour of the methods and aims of experimental or natural science, as in the Renaissance period in Europe generally. Gassendi, though, it is who must be regarded as the renewer *par excellence*, in modern times, of systematic materialism. He developed the doctrine of Democritus, by endowing the atoms with force and even with sensation. Lamettrie, by his materialistic account of the functions of the mind, prepared the way in France for the comprehensive materialism of Baron Holbach, whose *Système de la Nature* is the *chef-d'œuvre* of French materialism. In Holbach materialism reaches its high-water mark. Applying materialism to anthropology, he seeks to show that man is only a physical being, and that morality or virtue is independent of the supports of positive religion and of theism.

The empirical method of Bacon and Locke, taken along with some things Locke said about matter being possibly made to think, and eagerly caught up by men like Voltaire, had countenanced in England as well as in France a materialistic treatment of the mental and spiritual powers of man, as in the works of Hobbes, Hartley, and Priestley. In Germany philosophy was in the main idealistic and speculative until the death of Hegel, but Vogt about 1850 applied the principles of materialism to psychology, holding that physiology pronounced definitely and categorically against the idea of individual immortality, as indeed against all notions founded on the idea of the independent existence of the soul. Moleschott and Büchner are associated with Vogt as upholders of materialism. Büchner's *Kraft und Stoff* ('Force and Matter') is the Bible of German materialism. Feuerbach and Strauss may be mentioned as philosophers who exchanged the spiritualistic monism of Hegel for materialistic monism.

The form in which materialism now appears has been determined by the doctrine of evolution. Materialism indeed might be said to have been absorbed in the wider theory of evolution, which goes beyond the mere antitheism or atheism of materialism, and seeks *positively* to show how the diversities and differences in the world can be accounted for by natural as opposed to supernatural or creative process. Haeckel is perhaps the most prominent upholder of the Darwinian hypothesis on the Continent.

Materialism may be examined from many points of view. (1) Materialism is scientific realism. It believes, i.e., in real physical entities, such as atoms and forces, and spaces and times. Now a belief in atoms leads, in physics, in chemistry, and in astronomy, to insoluble contradictions: atoms, for example, for physical purposes must be at once absolutely impenetrable and unalterable, and yet absolutely elastic and alterable. It would be more correct, in fact, to reduce matter to forces than to atoms, as many theorists have done. But it is difficult to think of forces existing without some sort of substrate. Spaces and times too are not physical things. Thus science is full of hypotheses; nor can it dispense with hypotheses. Complete physical realism or materialism is, in short, theoretically impossible. (2) Even granting—which in strictness we cannot—the existence of 'mere matter,' science has as yet found insuperable difficulty in passing from unorganised to organised matter. (3) Psychology has as yet been unable to regard organic states as accounting for psychical or mental states. The two are totally different, and, though correlated, cannot be said to be causally connected. (4) Materialism cannot furnish a complete or consistent ethical theory. If man is entirely the product of natural forces, and in fact the sport of natural forces, it is meaningless to think or speak of him as morally obliged either to follow or to resist nature. Man not only follows and resists nature, but in mechanical and artistic construction commands and anticipates and surpasses nature. Of course to materialism the belief in human freedom, which practically makes history, is an illusion, but it is difficult to see how on the materialistic hypothesis even this illusory belief could have arisen. (5) Although materialistic evolution may succeed in showing that we ought not to regard certain natural adaptations and productions as special and final creations, it cannot and does not avoid the question of teleology. Neither hylozoism nor mechanism, nor unconscious selection and adaptation accounts for that relativity of everything to everything, which is really what at bottom is meant by teleology. There must be a world-soul or world-thought for whom the universe is realised end. (6) There is the philosophical question about mere matter. It has again and again been confessed by scientists as well as by philosophers that by matter can only, in the last resort, be meant what J. S. Mill calls the permanent possibility of sensation. There is in fact no object (or objective thing) without a subject (or consciousness). If the materialist at once reply that there is no subject without an object, he is in the right as against the thesis. The idealist, in short, and the materialist are in the right as against each other. Subject and object imply each other. We cannot begin with either in order to explain from it the other.

Materialism brings prominently before us that side of the universe which is compassed by the

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methods of physical science. But physical science, like (say) economic or theological or mental science, takes a one-sided or 'abstract' view of experience. All sciences 'abstract' from the concrete whole of experience contain facts which they propose to investigate in detail. Physicists, like metaphysicians and theologians, are apt to become dogmatical about spheres of inquiry of which they know professedly nothing.

BIBLIOGRAPHY.—Text-books of Materialism which have not already been mentioned are: Gassendi, *De Vita, Moribus, et Doctrinis Epicuri* (Leyden, 1647); Lamettrie, *L'Homme Machine* (Leyden, 1748); Haeckel, *Natürliche Schöpfungsgeschichte* (1868; Eng. trans. 2d ed. 1875–76); Wiener, *Grundzüge der Weltordnung* (1863–69); and Huxley's Address at Belfast, 1875. For an examination of Materialism, see any account of Kant's *Critical Philosophy;* or the statement of Dogmatism given in *Fichte*, by Adamson (Blackwood's 'Philosophical Classics'); also *As regards Protoplasm*, by Dr Hutchison Stirling; *Concepts of Modern Physics*, by J. B. Stalls, containing a sifting examination of the atomic theory; *Reign of Law*, by the Duke of Argyll; and St George Mivart's books. The best history of Materialism is Lange's *Geschichte des Materialismus* (Eng. trans. 1878–81).

Materia Medica is that department of the science of medicine, belonging partly to pharmacology, partly to therapeutics, which treats of the materials employed for the alleviation and cure of disease, their properties, physiological actions, and uses. See PHARMACOPŒIA, POISONS, MEDICINE, APERIENTS, and articles on the various drugs.

Mathematics (Gr. *mathēma*, 'learning'), the science which has for its subject-matter the properties of magnitude and number. It is usually divided into *pure* and *mixed* or *applied;* the first including all deductions from the abstract, self-evident relations of magnitude and number, the second the results arrived at by applying the principles so established to certain relations found by observation to exist among the phenomena of nature. The branches of pure mathematics which were first developed were, naturally, *Arithmetic*, or the science of number, and *Geometry*, or the science of quantity (in extension). The latter of these was the only branch of mathematics cultivated by the Greeks, their cumbrous notation opposing a barrier to any effective progress in the former science. Algebra or the science of numbers in its most general form is of much later growth, and was at first merely a kind of universal arithmetic, general symbols taking the place of numbers; but its extraordinary development within the last two centuries has established for it a right to be considered as a distinct science, the *science of operations*. Combinations of these three have given rise to trigonometry and analytical geometry. All those sciences in which a few simple axioms are mathematically shown to be sufficient for the deduction of the most important natural phenomena are regarded as belonging to applied mathematics. This definition includes those sciences which treat of pressure, motion, light, heat, sound, electricity, and magnetism—usually called *Physics*—and excludes chemistry, geology, political economy, and the other branches of science, which, however, receive more or less aid from mathematics. See GEOMETRY, and the works there cited; as also, besides articles on the subjects named above, and many others, the following:

Astronomy.	Ellipse.	Graphic Statics.	Logarithms.
Calculus.	Energy.	Hydrodynamics.	Numbers.
Centre.	Equations.	Hydrostatics.	Optics.
Circle.	Fluxions.	Hyperbola.	Parabola.
Dynamics.	Friction.	Lenses.	Probability.

Mather, INCREASE, a famous American colonial divine, was the sixth son of Richard Mather, an English Nonconformist minister, who emigrated to Massachusetts in 1635. He was born at Dorchester, Massachusetts, June 21, 1639, graduated at Harvard College in 1656, and again at Trinity College, Dublin, in 1658. His first charge, at Great Torrington in Devonshire, was given him on the advice of John Howe. He next preached in Guernsey, but in 1661, finding it impossible to conform, returned to America, and in 1664 was ordained as pastor of the North Church, Boston, where he remained till his death, August 23, 1723. In 1681 he was also chosen president of Harvard College. An industrious student, he published no less than 136 separate works, most of which are now very scarce. Of these the most interesting, *Remarkable Providences* (1684), was reprinted in London in 1856. The *History of the War with the Indians* (1676) was reprinted at Boston in 1862. Mather's influence was great in the colony, and in 1689 he was sent to England to lay its grievances before the king. He was successful in obtaining a new charter from William III., and on his return was thanked by the speaker of the general assembly. The same year he became the first D.D. of Harvard. To his credit he was far less an alarmist about witchcraft than his son, and he had the good fortune to be absent in England during the time of fiercest excitement in the Salem mania. His *Causes of Conscience concerning Witchcraft* (1693) did much to cool the heated imaginations of the New England colonists, and saved lives by refuting the doctrine of 'spectral evidence.'

His son, COTTON MATHER, was born in Boston, February 12, 1663, and graduated in 1678 at Harvard, where his precocious learning and piety excited great expectations. He entered upon a course of fasting and vigils, cured a habit of stammering by speaking with 'dilated deliberation,' studied theology, and became the colleague of his father in the ministry of the North Church at Boston. His industry was phenomenal and his learning remarkable, while his vanity and fluency enabled him to pour from the press as many as 382 books. He took a fatal interest in witchcraft, and his *Memorable Providences relating to Witchcraft and Possessions* (1685) did much to fan the cruel fury of the New Englanders. The first phenomena of the notorious Salem witchcraft mania occurred in 1692, and Mather plunged into the discussion, and to convince the world wrote his *Wonders of the Invisible World* (1692). While it is true that his contemporaries fully shared his belief in witchcraft, none pursued the inquiry with such hateful zeal, and on the head of none rests a heavier burden of bloodguiltiness. Even himself afterwards confessed that 'there had been a going too far in that affair.' Mather died February 13, 1728.

The chief of his works is *Magnalia Christi Americana* (1702), an undigested mass of materials for the church history of New England. His feeble *Essays to do Good* (1710) was much esteemed by Franklin. His life was written by his son, Samuel Mather (1729). See also Charles W. Upham, *History of the Salem Delusion, 1692* (1831); and the Rev. Enoch Pond, *The Mather Family* (1844).

Mathew, THEOBALD, commonly known as FATHER MATHEW, an eminent Irish apostle of temperance, was born at Thomastown in Tipperary, October 10, 1790. He studied for the Roman Catholic priesthood at Kilkenny and for a short time at Maynooth, but relinquished the secular priesthood for the religious order of the Capuchins, in which he took priest's orders in 1814, and was sent to the church of his order in the city of Cork. Here he devoted himself to the ceaseless labours of his calling with untiring zeal, and, finding that the poverty and degradation of his people were to a great extent directly due to over-drinking, was driven by his enthusiastic temper to advocate the

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drastic remedy of total abstinence. In 1838 he began his crusade, which quickly grew beyond the bounds of Cork, and extended to Dublin, to the North, to Liverpool, Manchester, London, Glasgow, and the other chief seats of the Irish population, even in the New World itself. His success had something of the marvellous in its character. The form of engagement partook of the religious, and was accompanied by the presentation of a medal, to which the utmost reverence was attached by the recipient; and an opinion prevailed among the poor that the mission of the 'Apostle of Temperance' was marked by many miraculous manifestations of the assistance of Heaven. Father Mathew's latter years were embittered by pecuniary embarrassments, the fruit of his unbounded charity, the enormous expenses connected with his mission, and perhaps his own improvident and unworldly habits. A Civil List pension of £300 was granted him in 1847, and a private subscription was also raised for his relief. The enthusiasm for his cause declined amid the sufferings of the potato-famine, and Father Mathew died, worn out by his labours, December 8, 1856. See Harriet Martineau's *Biographical Sketches*, and Lives by J. F. Maguire (1863) and F. J. Matthew (1890).

Mathews, CHARLES, comedian, was born in London, 28th June 1776, and educated at Merchant Taylors'. His father was a bookseller, and intended his son to follow the same 'serious calling;' but his early inclination for the stage overcame parental counsel, and he made his first appearance as an amateur—in the part of Richmond—at the Richmond theatre in 1793, and as a professional comedian in the Theatre Royal, Dublin, the following year. He then served an apprenticeship in the famous York company under Tate Wilkinson, and made his first appearance in London on 15th May 1803, at the Haymarket, then managed by George Colman. Next year he played at Drury Lane, and he afterwards acted at Covent Garden and the Lyceum; but he was not satisfied with the class of part given to him, and in 1818 he took up the profession of 'entertainer' and made an immense success with his 'At Home' and other entertainments. In this class of business he passed the remainder of his life, appearing frequently in the provinces and visiting America twice. He died at Plymouth on 28th June 1835. Mathews was a true comedian, with extraordinary powers of impersonation, entering into the very mind of the persons he imitated. He was not merely a 'mimic'—one who reproduces oddities and peculiarities: he *was* the person he represented. See his Memoirs by Mrs Mathews (4 vols. 1838–39).—His son, CHARLES JAMES (born 26th December 1803; died 24th June 1878), was a delightful light comedian, with no depth of feeling, but with charming grace and delicacy. In 1838 he married the famous Madame Vestris. See his *Life, chiefly Autobiographical*, edited by Charles Dickens (2 vols. 1879).

Mathias Corvinus. See MATTHIAS.

Mathilda, Countess of Tuscany, well known in history through her constant support of Pope Gregory VII. in his long struggle with the Empire, was a daughter of Boniface, Count of Tuscany, and of Beatrice of Lorraine, and was born in 1046. She married first Godfrey (surnamed the Hunchback), Duke of Lorraine, from whom she lived separate in Italy, and afterwards, when over forty years of age, the boy Guelph of Bavaria. Both were mere alliances of policy. In 1077 she made a gift of all her vast possessions to the church, a bequest that caused a long contest. It was at her castle of Canossa that Henry IV. did his humiliating penance to Pope Gregory. Four years later she alone stood by the pope when Henry poured his troops into Italy, she supported him with money when he was besieged in Rome, and after his death at Salerno boldly carried on the war against the emperor. 'The great Countess' died in 1115.

Mathura. See MUTTRA.

Matico (*Artanthe elongata*), a shrub of the natural order Piperaceæ, a native of Peru, remarkable for the styptic property of its leaves, which are used for stanching wounds, and for other medicinal qualities.

Matilda, 'the Empress Maud' (1103–67), was the only daughter of Henry I. (q.v.) of England, married in 1114 to the Emperor Henry V., and after his death in 1128 to Geoffrey of Anjou, by whom she became mother of Henry, afterwards Henry II. (q.v.) of England. There was civil war between her and Stephen (q.v.) from 1139 till 1147.

Matins. See BREVIARY.

Matlock, a Derbyshire parish, 17 miles N. by W. of Derby, containing Matlock Bath, Matlock Bridge, Matlock town, and Matlock Bank, which extend for about 2 miles along the romantic valley of the Derwent. Matlock Bath is noted for a huge lime-tree and for its hot springs of 68° F., the waters of which are largely charged with carbonic acid, and were first used for curative purposes in 1698. At Matlock Bank are several hydropathics, the earliest dating from 1851; and together the four Matlocks have a dozen hotels. Among the lions of this beautiful neighbourhood are the High Tor (400 feet), the Heights of Abraham and the Masson (1110 feet), and a number of large stalactite caverns with 'petrifying' wells. There are manufactures of cotton, paper, and spar ornaments. Pop. of parish (1851) 4010; (1881) 6093, of whom 4395 were in Matlock town.

Matriarchate. See FAMILY.

Matsumai, a seaport of Japan, situated at the south-west extremity of the island of Yesso (Yezo), at the western entrance to the Strait of Tsugaru. Formerly the principal town of the island, it has in recent times been outstripped by its more successful rival Hakodate. Pop. (1887) 31,037.

Matsys, or MASSYS, QUENTIN, Flemish painter, born at Louvain about 1466, was originally, according to a legend long current, a blacksmith who turned artist. However the connection be explained, it is certain that he settled in Antwerp in 1491, and was in that year admitted a member of the painters' guild of St Luke, and died in that city in 1530 or 1531. He forms a connecting link between the school of the Van Eycks and the later realistic Dutch school. His pictures are mostly religious, treated with a reverent spirit, but with decided touches of realism, and are remarkable for their glow of colour, their absence of light and shade, and their exquisite finish, especially in minor details. An altarpiece representing the Virgin and Child, painted for the cathedral of Louvain; another for the cathedral of Antwerp, the 'Burial of Christ,' flanked by the 'Martyrdom of John the Baptist' and the 'Martyrdom of John the Evangelist;' and two other examples of the Virgin and Child are his best religious pictures. Such genre-pieces as 'The Money-changers,' 'The Gaoler,' and others exhibit his realistic tendencies. Matsys also takes high rank as a portrait-painter; excellent specimens of his skill in this department are the portraits of Petrus Ægidius and of Maximilian of Austria. He seems to have been acquainted with Lucas van Leyden, Holbein, Dürer, Erasmus, Sir Thomas More, and other notable contemporaries.

Matter. It is impossible to give a really satisfactory definition of this term. We may employ as equivalents such words as Stuff, Substance,

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Body, &c., but all are inadequate. The reason is simply that we do not yet know what Matter is, and it is probable that we shall never be able to obtain an exact and complete conception of its true nature. Metaphysicians differ among themselves more perhaps on this subject than on almost any other. Some of them deny altogether the possibility of objective existence. Many, however, tell us that 'Matter is whatever can be perceived by the senses.' Others vary the phrase slightly, and call matter a 'Permanent possibility of sensation.' Hegel defines it as 'Nature self-externality in its most universal form, with a tendency to self-internality or individuation shown in the nisus of gravitation'! Scientific men can, as yet, define matter only by some of its properties. One of their favourite definitions is Matter is what can occupy space. Another is that which possesses inertia. Again, it may be regarded as the vehicle of Energy (q.v.), inasmuch as energy is never found except in association with matter. But the scientific man, though confessing that none of his definitions can be adequate, knows that each of them expresses some part of the truth; and he also knows that the metaphysical definitions cited above (so far at least as they are intelligible) are erroneous. For it is by the senses alone that we know of the existence of energy, and energy is certainly not matter. Again, the notion of Force (q.v.) is entirely sense-suggested, and force is not matter—has not even objective existence.

But, though the ultimate *nature* of matter is unknown, we already know much about its structure and properties, as well as about what (for the present at least) we must call its various kinds. To a brief sketch of these the present article is devoted. Beside that unique and all-pervading species of matter which we call the Ether (q.v.), which certainly satisfies the scientific definitions quoted above, but about which we know little more, we have what is called gross or ordinary matter. This we find in two forms, solid or fluid. These are sharply distinguished from one another by their elastic properties. For, while solids (as a rule) possess, in a more or less imperfect degree, elasticity alike of bulk and of form, fluids possess the first in perfection and are absolutely devoid of the second. Fluids again are divided into liquids, vapours, and gases. These distinctions, in the case of any one substance, as well as that between solids and fluids, are found to depend mainly upon temperature.

The existence of the gaseous state, with its very special features, has enabled us to obtain great insight into the structure of matter. For experiment has assured us that a gas is not a continuous substance, but an assemblage of an enormous number of perfectly distinct and independent particles, each of which moves freely till it collides with another, and thus some eight thousand million times per second has its motion completely changed. The number of such separate particles in a single cubic inch of air contains twenty-one figures—i.e. is expressed in hundreds of trillions. Yet they are very far from filling that space. Their total bulk probably amounts to less than the five-hundredth part of it. We are unable to discover any differences among the particles of the oxygen group, or among those of the nitrogen: though, by delicate processes not involving chemistry, we can detect a difference between the properties of an oxygen and of a nitrogen particle.

As all known simple substances can be brought into the gaseous form, we have a proof that every simple solid or fluid must be built up of particles absolutely equal to one another. We figure to ourselves what we call Molecular Forces (q.v.) as the cause of the agglomeration, and ascribe the various states of solid, liquid, vapour, and gas in any one substance to the greater or less relative activity of the molecular forces (attractive) and of the thermal motions (disjunctive or dispersive). The modern kinetic theory of Gases (q.v.) has thus enabled us to account for at least the more simple of their physical properties, such as the experimental relations among pressure, volume, and temperature, known as the laws of Boyle and Charles; and the equality of numbers of particles in a cubic inch of each of two gases at the same temperature and pressure, known as Avogadro's Law; as well as to study the mechanism of gaseous viscosity, diffusion, and heat-conduction. Much has already been done towards the explanation of the 'critical temperature' and the vapour state with its relation to that of liquid, and further progress may soon be expected. On the other hand, a great deal of information as to the liquid aggregate has been obtained from experiments on Capillarity (q.v.) and Compressibility (q.v.); and as to the solid aggregate from its elastic properties, &c., but specially from the forms of crystals (see CRYSTALLOGRAPHY). Besides the molecular forces mentioned above, which are generally understood as those exerted between particles of the same kind, we have those of Chemical Affinity, which are exerted between any two particles of different kinds. Physical experiments, following those of Andrews on the compressibility of gaseous mixtures, promise to give us much information on this subject; but, in the main, it is at present more immediately in the domain of Chemistry (q.v.), to which we must refer for the discussion of Atomic Weights, Combining Volumes, Valency, &c.

Beyond the state of equal independent particles, as in a simple gas, we know as yet nothing. Many of the properties of the individual particles can be obtained from the properties of the aggregate, others by the help of Spectrum Analysis (q.v.). But in answer to the question, Do the particles of different simple substances consist of one and the same ultimate material, or no? intensely attractive as it is, we have absolutely nothing to say. So it is with the question, Are these particles themselves further divisible, or are they atoms? Atoms (q.v.), whether Lucretian or Vortical, are not even proved to exist. We must, therefore, in further discussing the subject, content ourselves with a few brief statements as to the *Properties of Matter*.

One of the most remarkable of these, what has been called Conservation of Matter, is the experimentally ascertained fact that no process at the command of man can destroy even a single particle of matter. Still less can it create a new one. It is on this definite basis that the great science of chemistry has been securely built. The Balance (q.v.), used to determine quantity of matter with the utmost precision, is its chief instrument. And this attribute of unchangeable quantity furnishes the most powerful of the arguments for the objective reality of matter.

Quantity of matter, or mass, as it is technically called, is measured by Inertia, which (as expressed in Newton's First Law of Motion) may be looked on as the fundamental property of matter. For it is a property possessed by every body, even a particle, *in itself*, and independently of the vicinity or even the existence of any other body. It is in virtue of its inertia that a body can possess energy of motion, and that work is required in order to set in motion even the smallest particle of matter. Similarly, until it can transfer its energy to some other body, a moving mass must continue to move.

Next in order of simplicity to inertia, which, as we have seen, is a property of every single particle,

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come the properties in virtue of which any system of two bodies, even if they be mere particles, possesses energy depending directly on the mass of each, and also upon their distance from one another. This part of the energy of a system gives rise to the phenomena of Gravitation (q.v.), Molecular Action, and Chemical Affinity. It has been shown by Sir W. Thomson that the first of these might suffice to account for the second if not the third (at all events in aggregates of particles), provided the structure of the aggregate were sufficiently heterogeneous. Be this as it may, we know much more about gravitation than about the other phenomena referred to, and will therefore confine our further remarks to it. And yet all that we know about gravitation can be summed up in the following statement: The potential energy of a system of two particles of matter is less when they are at a finite distance apart than when they are infinitely distant from one another, by an amount which is directly as the product of their masses and inversely as their distance apart. This statement, it is to be particularly observed, contains no allusion to attraction or (so-called) force of any kind; yet it suffices for the complete formation of the equations of motion of any system of gravitating masses, be it as complex as the solar system itself. The rest of the calculation is a matter of mathematics and of numerical data alone. Many attempts, often extremely ingenious, but all alike fruitless, have been made to explain gravitation. Such failure, however, in the eyes of a genuine scientific man is only an encouragement to perseverance; and the very remarkable success which has attended Clerk-Maxwell's attempt to explain electric and magnetic phenomena by means of the luminiferous medium renders it at least probable that the properties of the ether will, some day, explain gravitation—possibly inertia also. Mere speculation, of course, is of use in science only in so far as it originates or directs inquiry, so that we must be content simply to express the idea that the ether may be the one material substance in the universe (*urstoff*), gross matter being simply differentiated portions of it—denser or less dense than the rest, perhaps mere cavities or bubbles. If so, the words of Fresnel may in time be verified: 'La Nature ne s'est pas embarrassée des difficultés d'analyse; elle n'a evité que la complication des moyens.'

The various *properties of matter*, discussed for the most part under their several heads, may be roughly divided into two classes—those which belong more particularly to matter in itself, and those which are specially related to various forms of energy. Among the former class may be mentioned, but only as examples, Capillarity, Cohesion, Compressibility, Density, Elasticity, Friction, Gravitation, Hardness, Inertia, Impenetrability, Malleability, Plasticity, Rigidity, Tenacity, Viscosity. Among the latter we have Colour, Absorptive Power, Transparency, Refractive and Reflective Power, Melting and Boiling Points, Specific Heat, Latent Heat, Conductivity (Thermal and Electric), Thermo-electric Power, Expansibility, Specific Inductive Capacity, Magnetic Permeability, &c. Even to name all the more important would greatly exceed our limits. See also MOLECULE.

Matterhorn, called by the French MONT CERVIN, and by the Italians MONTE SILVIO, a peak of the Alps between the Swiss canton of Valais and Piedmont, rises to the altitude of 14,705 feet. The actual peak was first scaled by Lord Francis Douglas, the Rev. C. Hudson, Hadow, and Whymper, with three guides, on 14th July 1865, when the three first-named and one of the guides fell over a precipice and were killed. See Whymper, *Ascent of the Matterhorn* (1880).

Matthew (Gr. *Matthaios*, Lat. *Matthæus*, from Heb. *Matthai*, a shortened form of *Mattithya*, *Mattathya*, or *Mattathai*, 'gift of Jehovah'), one of the twelve apostles (Matt. x. 3; Mark, iii. 18; Luke, v. 15; Acts, i. 13), and, according to tradition, the author of the first of the four canonical gospels, was a publican or tax-gatherer (Matt. x. 3) at Capernaum when called to the apostolate by Jesus, as related in Matt. ix. 9. The closely parallel passages in Mark (ii. 14) and Luke (v. 27) mention Levi in the same connection, and the general belief is that this is simply another name for the same person (compare the double names Simon and Peter, Joses and Barnabas), though the identification has been disputed both in ancient and in modern times by many weighty authorities, among whom may be mentioned Origen, Grotius, Michaelis, Neander, Ewald, Reuss, and Keim. Except in the four lists of the apostles and in Mark, ix. 9, Matthew is nowhere mentioned by name in the New Testament, and ecclesiastical tradition has little to tell of him. An early authority (Heracleon, reported by Clement of Alexandria) represents him as having died a natural death; by other writers he is stated, but with considerable vacillations, to have written a gospel for the Christians in Palestine after the dispersion of the apostles, and, after having preached the word in Parthia and Ethiopia, to have suffered martyrdom. The most important extant statement regarding him is that of Papias (bishop of Hierapolis in the 2d century), preserved by Eusebius, to the effect that 'Matthew wrote in the Hebrew (Western Aramaic) dialect a collection of the sayings of the Lord, and each one interpreted them as best he could.' This passage was long accepted as conclusive testimony to the truth of the universally current belief that Matthew the apostle was the author of our first canonical gospel (it being tacitly or expressly assumed that at some later date an authentic Greek translation had been made by himself from the Aramaic original vouched for by Papias). Modern criticism of the gospels (see GOSPELS) has led to the general adoption of another view of the passage, according to which it refers to the 'logia' document, or collection of discourses and sayings of Jesus, written in Aramaic by Matthew, which is now believed to have been one of the most important written sources used by the authors of the existing first and third gospels. In this sense, and also as having been prepared primarily with a view to the needs of Jewish Christians, the first gospel is correctly described as the 'gospel according to Matthew.' But that this gospel cannot be of directly apostolic origin, or the work of an actual companion of Jesus, is shown by the artificiality of its arrangement, the vagueness of its references, and its obvious dependence on previous authorities. As to the date of its composition critics are not agreed whether it ought to be placed before or after the year 70 A.D., some seeing in the book numerous references to Jerusalem and the temple and its institutions as still subsisting, while others interpret such a passage as Matt. xxii. 7 as certainly showing that the destruction of the city had already taken place. The first gospel is much more largely quoted than any other by early Christian writers, and in view of the fact that it successfully aimed at a reconciliation between a Jewish and a cosmopolitan conception of Christ as 'legal, yet above the law, as Jewish, yet above Judaism,' it has been characterised by Renan as 'the most important book ever written.' For literature, see GOSPELS.

Matthew of Westminster, long supposed to be the author of the meritorious *Flores Historiarum*. Sir F. Madden considered his existence as more than doubtful, the work being merely a

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special abridgment of the larger work of Matthew Paris, made under that writer's supervision down to 1249; brought down at St Albans to 1259, at which year Paris's chronicle ends; thereafter continued there down to 1265; next brought down to 1325 at Westminster, in part by John Bever, *alias* John of London. Sir T. D. Hardy, however, thinks it based on the original writer who preceded Wendover as historian at St Albans, whom he identifies as one Walter of St Albans, precentor and librarian in the latter half of the 12th century. Copies of his chronicle would become disseminated, and that at Westminster, by its borrowings from the works of Wendover and Matthew Paris, might well have been taken for a mere abridgment of these. The *Flores Historiarum* was first printed by Archbishop Parker in 1567. A translation by Yonge was published in Bohn's 'Antiquarian Library' (2 vols. 1853).

Matthew Paris. See PARIS.

Matthias Corvinus, king of Hungary, the second son of John Hunyady (q.v.), was born at Klausenburg on 27th March 1443. His father having died, his elder brother was slain and himself imprisoned by order of Ladislaus Posthumus, king of Hungary and Bohemia. After the death of this king Matthias was elected by the magnates to the vacant throne (1458). But it cost him a six years' hard struggle against Turks, Bohemians, the Emperor Frederick III., and disaffected magnates before he could venture to have himself crowned at Stuhlweissenburg. He drove the Turks back across the frontiers of his kingdom, and made himself master of Bosnia (1462), and of Moldavia and Wallachia (1467), before he granted them a truce. This breathing-space Matthias employed in making war upon Podiebrad, king of Bohemia, his own father-in-law, whose crown had been offered to him by the pope. Podiebrad died in 1470, but the war was continued against his successor, Ladislaus of Poland. In the midst of the war the magnates rebelled, because their king disregarded their political rights and influence, and offered his throne to Casimir, brother of Ladislaus. But Matthias managed to appease them, and in 1478 he concluded peace with Ladislaus, obtaining Moravia, Silesia, and Lusatia. Out of this war grew another with Frederick III., in which Matthias besieged and captured Vienna (1485). This he made his capital, and two years later he took possession of a large part of Austria proper. Since 1469 the Turks had renewed their terrible invasions of Hungary; but at length in 1479 they met with just chastisement, at Kenyermezö, at the hands of Stephen Bathori of Transylvania. But Matthias, who died at Vienna on 6th April 1490, was more than an ambitious conqueror. He greatly encouraged arts and letters: he founded the university of Budapest, built an observatory, summoned scholars and artists to his court, adorned his capital with the works of renowned sculptors, employed a staff of literary men in Italy to copy valuable manuscripts, and so founded a magnificent library. This was scattered when the Turks captured Budapest in 1526. The surviving books were restored by the sultan in 1877. At the same time the finances were brought into a flourishing condition, industry and commerce were promoted by wise legislation, and justice was administered strictly to peasant and noble alike. But his rule was arbitrary and his taxes heavy; he wasted much money in pompous display; and he overrode the rights of the magnates.

Matto Grosso ('dense forest'), an inland state of Brazil, bordering on Bolivia: it is second to Amazonas alone, both in size and sparsity of population. Area, 532,708 sq. m.; pop. (1888) 79,750, nearly all Indians and blacks. Within this vast territory several great rivers rise, including the Madeira and the Paraguay; but in most parts there is a scarcity of water during the dry season. The vegetation is generally scanty, grass, bush, and low trees covering the sandstone plateau; high trees and rich vegetation are confined to the river-valleys. The gold and diamonds which formerly constituted the wealth of Matto Grosso have been exhausted, and agriculture (insufficient for the wants of the state) and cattle-raising, with the gathering of medicinal plants by the Indians, are now the principal industries. The capital is Cuyabá (q.v.). The former capital, Matto Grosso, on the Guaporé, decayed with the gold-mining industry, and is now a fever-haunted place with only some 1500 inhabitants.

Mattoon, a town of Illinois, 172 miles by rail S. by W. of Chicago. It contains railway-shops, flour-mills, and grain-elevators, and manufactures castings and drain tiles. Pop. 5737.

Maturin, a section of the Venezuelan state Bermudez, lying W. of the Orinoco delta, and consisting almost entirely of llanos. Area, 13,100 sq. m.; pop. (1886) 60,541.—Maturin town, on the Guarapiche, has plantations of cacao, and a trade with the West Indies. Its port is Colorado, 25 miles below, and a railway has been constructed to this point. Pop. 11,351.

Maturin, CHARLES ROBERT, dramatist and romancer, was born in 1782, waged warfare with poverty as curate of St Peter's, Dublin, and died there, October 30, 1824, after making his name at least notorious by a series of extravagant novels that outdid Miss Radcliffe. These were *The Fatal Revenge*, *The Wild Irish Boy*, *The Milesian Chief*: and later, *Women*, *Melmoth*, and *The Albigenses*. His tragedy, *Bertram*, had a success at Drury Lane in 1816; its successors, *Manuel* and *Fredolpho*, were promptly damned.

Maubeuge, a fortified town in the French department of Nord, 4 miles from the Belgian frontier; pop. 5499.

Mauch Chunk, a mining-town of Pennsylvania, capital of Carbon county, is situated among picturesque hills on the Lehigh River, 90 miles by rail NNW. of Philadelphia. There is a switchback railway, 9 miles long, from the town to Summit Hill—a place famous for its 'burning mines,' which have been on fire since 1858. Pop. 3752.

Mauchline, a town of Ayrshire, 12 miles ENE. of Ayr, and 10 SSE. of Kilmarnock. It has long been noted for its wooden snuff-boxes and similar nicknacks. There is a monument (1830) to five martyred covenanters; and 1 mile N. is Mossgiel, Burns's farm from 1784 till 1788; whilst in the village itself are 'Poosie Nancy's,' the scene of his *Jolly Beggars*, and Mauchline kirk, of his *Holy Fair*. Pop. 1616. See works by W. Jolly (1881) and the Rev. Dr Edgar (1886).

Maud. See MATILDA.

Maudsley, HENRY, a prominent student of mental pathology, was born near Giggleswick in the West Riding of Yorkshire, February 5, 1835, and was educated at Giggleswick grammar-school and University College, London. He graduated M.D. at the university of London in 1857, was for a time physician to the Manchester Royal Lunatic Asylum, but returned to London in 1862 to be a consulting physician. In 1870, now an F.R.C.P., he was Gulstonian lecturer; and from 1869 to 1879 he filled the chair of Medical Jurisprudence at University College. His works are *The Physiology and Pathology of the Mind* (1867), *Responsibility in Mental Disease* (1872), *Body and Will* (1883), and *Natural Causes and Supernatural Seemings* (1886).

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Maulmain, or MOULMEIN, a town in the province of Tenasserim, Burma, near the mouth of the Salween River. It is backed by a fine range of hills, on whose heights flash the gilded spires of innumerable pagodas; and here, too, are built many pretty residences, commanding a fine view of the town, river, and adjacent country, which for picturesque beauty and varied scenery has few equals. There are numerous public buildings, churches, chapels, and missionary establishments, several charitable and educational institutions, barracks, a hospital, gaol, &c. Pop. (1856) 43,683; (1881) 53,080; of whom about 27,000 were Buddhists, 11,000 Hindus, 6000 Mussulmans, and 2000 Christians. The value of exports reaches £1,500,000 in some years, and of imports about £1,000,000. The principal exports from Maulmain are teak-wood and rice; the imports consist of general merchandise, chiefly piece-goods, hardware, provisions, and sundries. See BURMA.

Maunder, SAMUEL, compiler, was born about 1790, and died 30th April 1849. He was a brother-in-law of Samuel Pinnock, assisted him in the preparation of his catechisms, and amongst other works which he compiled are *Biographical Treasury*, *Scientific and Literary Treasury*, *Treasury of Knowledge*, *Treasury of History*, &c. These books have been frequently revised and new editions issued.

Maundeville. See MANDEVILLE.

Maundy-Thursday, the Thursday of Holy Week (q.v.). The name *Dies mandati* is derived from the ancient custom of washing the feet of the poor on this day, and singing at the same time the anthem *Mandatum novum*, which is taken from John, xiii. 34. This rite, called *mandatum* or *lavipedum*, is of great antiquity, both in the Eastern and Western churches. In more modern times it came to be accompanied by a distribution of 'doles,' placed in small baskets, thence called 'maunds.' In the royal usage of the maund in England, the number of doles distributed is reckoned by the years of the monarch, and their value is 1d. for each year of the sovereign's life. James II. was the last English sovereign who performed this ceremony in person; but the Austrian emperor, Francis Joseph, continued the custom from 1849 till 1888, washing every year the feet of twelve old men. In Madrid the ceremony is retained, the feet of twelve old men and twelve old women being touched with a sponge and towel by the sovereign, who afterwards serves them at table; and in 1889 the feet of twelve boys were washed in the Roman Catholic pro-cathedral at Kensington by one of the bishops, each boy also receiving a piece of money. During the middle ages the maund was held in all monasteries and great houses; and in the Household Book of the Earl of Northumberland, which begins in 1512, there are entries of 'al maner of things yerly yevin by my lorde of his Maundy and my laidis and his lordshippis childeren.' See Skeat's edition of *The Vision of Piers the Plowman* (vol. i. p. 488, l. 140, note).

Maupassant, GUY DE, a clever French writer, was born 5th August 1850, at the castle of Miromesnil in Normandy, and, after carrying a musket through the Franco-German war, was initiated by Gustave Flaubert into the craft of letters. He attached himself to the younger branch of the naturalistic school, and wrote himself in by a story contributed to the *Soirées de Médan* (1880). He next produced a play, *Histoire du Vieux Temps*, and a striking volume of lyrics published under the title *Des Vers* (1880). But he won his real reputation as a novelist and story-teller, with *La Maison Tellier* (1881), *Les Sœurs Rondoli* (1884), *Contes du Jour* (1885), *Contes et Nouvelles* (1885), *Monsieur Parent* (1885), *Bel-Ami* (1885), *La petite Roque* (1886), *Pierre et Jean* (1888), and *Fort comme la Mort* (1889).

Maupertuis, PIERRE LOUIS MOREAU DE, a French mathematician, was born at St Malo on 17th July 1698. After serving in the army for five years, he withdrew from it to pursue his favourite study, mathematics. His able advocacy of Newton's physical theory, in opposition to that of Descartes, gained him admittance to the Royal Society of London in 1728. In 1736–37 he was placed at the head of the Academicians whom Louis XV. sent to Lapland, to obtain the exact measurement of a degree of longitude, whilst the same thing was being done in Peru by La Condamine. This operation Maupertuis described in *De la Figure de la Terre* (Paris, 1738). In 1740 he went to Berlin, on the invitation of Frederick II., who made him president of the Academy. Having accompanied the Prussian army to the field, he was taken prisoner at Mollwitz by the Austrians in 1741. He returned to Berlin in 1744; but his morbid *amour-propre* and tyrannical disposition excited general dislike. Besides being engaged in a bitter quarrel with König as to the merits of Leibnitz, he incurred the enmity of Voltaire, who satirised him in *Micromegas* and *Diatribe du Docteur Akakia*, which drove Maupertuis away to Basel to recoup his health, and to enjoy the society of the Bernouillis, but he died there, 27th July 1759. Maupertuis was a mathematician of good ability, but owed his celebrity as much to the idiosyncrasies of his manners and disposition as to his merit. His *Works*, 4 vols., appeared at Paris in 1752, and at Lyons in 1768. See Life by Beaumelle (1856).

Maurepas, JEAN FRÉDÉRIC PHÉLIPPEUX, COMTE DE, a French statesman, born in 1701 at Paris. He was brought up for public life, and was early entrusted with office, but contrived to displease the all-powerful Pompadour, and was banished from court in 1749. He was recalled and made first minister at the accession of Louis XVI. (1774), and he succeeded in carrying out his policy of humiliating England by recognising the United States; but his was not the hand to hold the helm in the face of fast-gathering storms. Yet he brought into the ministry men far greater and wiser than himself—Turgot, Malesherbes, and Necker. He died 21st November 1781. His *Mémoires* (4 vols. 1792) were edited by his secretary, Sallé.

Maurice, PRINCE OF ORANGE and COUNT OF NASSAU, one of the most skilful generals of his age, was the son of William the Silent, Prince of Orange, and was born at Dillenburg, 13th November 1567. After his father's assassination in 1584, the provinces of Holland and Zealand, and afterwards Utrecht and the others, elected him their stadtholder. A great portion of the Netherlands was still in the hands of the Spaniards; but, under the admirable leadership of Maurice, the Dutch, aided by an English contingent under the Earl of Leicester and Sir Philip Sidney, rapidly wrested cities and fortresses from their enemies. In 1590 Breda, and in 1591 Zutphen, Deventer, Nimeguen, and other places fell into their hands, in 1593 Geertruidenberg, and in 1594 Groningen. In 1597 he defeated the Spaniards at Turnhout in Brabant, and in 1600 won a splendid victory at Nieuwpoort. Then for more than three years he baffled all the power of Spain by his defence of Ostend. Finally, in 1609, Spain was compelled to acknowledge the United Provinces as a free republic. But from this time keen dissension grew up between the Orange party, who favoured the Gomarists, and

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the Remonstrants or Arminians, who found their chief supporters in aristocratic republicans like Olden Barneveldt (q.v.; see also ARMINIUS). The former emerged victors from the struggle, and Maurice at once (1621) renewed the war with Spain. He died, unmarried, at The Hague, 23d April 1625. See Groen van Prinsterer, *Maurice et Barneveldt* (Utrecht, 1875).

Maurice, JOHN FREDERICK DENISON, one of the most influential thinkers and social reformers of his age, was the son of a Unitarian minister, and was born at Normanston, near Lowestoft, 29th August 1805. In 1814 the family removed to Frenchay, near Bristol; and in 1823 he went up to Trinity College, Cambridge, thence migrating to Trinity Hall. His reputation at the university for scholarship stood high, but, being at this time a dissenter, he left Cambridge in 1827 without taking a degree, and commenced a literary career in London. He wrote a novel, *Eustace Conway*, and for a time edited the *Athenæum*, then recently started. His spirit had, however, been profoundly stirred and influenced by Coleridge, and he resolved to take orders in the Church of England. He proceeded to Oxford, where he took the degree of M.A., and was ordained a priest in 1834. He became chaplain to Guy's Hospital in 1837; in 1840 professor of Literature at King's College, London, where he was professor of Theology from 1846 till 1853. In 1846 he was appointed chaplain of Lincoln's Inn, and left Guy's Hospital. He continued chaplain of Lincoln's Inn until 1860, when he accepted the incumbency of Vere Street Chapel, which he held until his election as professor of Moral Philosophy at Cambridge in 1866. He died in London on 1st April 1872, and was buried at Highgate. The publication in 1853 of his *Theological Essays*, in which he dealt with the difficulties which hinder the acceptance of faith in Christ, lost him the professorship of Theology in King's College. The controversy turned on the doctrines of the atonement and eternal life. The atonement he declared to be not a terrible necessity but a glorious gospel, not of pardon for sin but deliverance from sin (see ATONEMENT); while Christ's definition of life eternal he maintained was opposed to the popular doctrine, which he regarded as a mixture of paganism and Christianity. The views set forth in this and other works were mainly these: that Christ was not the founder of 'a religion,' but king of all men, ruling now where he least seems to rule; that Christ's church does not consist of a few privileged persons, but is the body which represents 'the marriage of the Lamb,' that marriage being the incarnation, or uniting of the Godhead with manhood; that the 'fall of Adam' is not the centre of theology, but an incident in the early education of the race, important only as representing the weakness of man apart from Christ, in whom he lives and moves and has his being; that the curse of Adam was the condemnation of the false position of the man apart from God, resting on his own strength; that Christ came preaching 'the kingdom of heaven,' that is, the actual reign of righteousness in the world, the revelation of which is not contained in a closed book, but is always going on, and looks not backward to the restoration of an Eden of tropical fruits and easy culture, but forward to the cultivation by work and rest of all man's faculties unto the measure of the stature of the fullness of Christ; that faith consists in trust in this King of men, and belief in the power of right and the impotence, despite its seeming strength, of evil, not in the acceptance of formulæ: that creeds, the Bible, the church, are valuable just in so far as they set forth Christ the King as the object of the faith of man; as substitutes for that faith they are only mischievous. His principal books are his *Moral and Metaphysical Philosophy*, *Religions of the World*, *Prophets and Kings of the Old Testament*, *Patriarchs and Lawgivers of the Old Testament*, *The Kingdom of Christ*, *The Doctrine of Sacrifice*, *Theological Essays*, *Lectures on the Ecclesiastical History of the First and Second Centuries*, *Gospel of St John*, *The Conscience*, and *Social Morality*. Maurice strenuously controverted Mansel's views on our knowledge of God, and denounced as false any political economy founded on selfishness and not on the Cross as the ruling power of the universe. He was the mainspring of the movement known as Christian Socialism, and the president of the society for promoting working-men's associations; and was also the founder and first principal of the Working-man's College, and the founder and the guiding spirit of the Queen's College for Women, in both of which he taught. He vehemently repudiated the position of a party-leader, and his influence consequently extended throughout all parties in the church. He denounced the whole party-system as tending to divide Christ's body, both in church and state. See the *Life of F. D. Maurice*, based mainly on his own letters, by his son, Colonel Maurice (2 vols. 1884).

Maurice of Saxony. See SAXONY.

Maurier. See DU MAURIER.

Maurists, a reformed congregation of Benedictines, originally established in Lorraine, but from 1618 onwards named after the 6th-century St Maur, and established at the abbey of St Maur-sur-Loire, 14 miles NW. of Saumur. Originally noted for their austerity, they were afterwards especially known for their services to learning. The headquarters of the order was subsequently in three houses near Paris, especially St Germain-des-Prés. The congregation was dissolved with other monastic orders in 1792, and the splendid conventual buildings at St Maur destroyed during the revolutionary troubles. Amongst the learned fathers of St Maur were such scholars as Mabillon, Montfaucon, D'Achéry, Martène, Rivet, Tassisi, Bouquet, Ruinart, Lami; and amongst the works published, besides admirable editions of the fathers, the *Art de Verifier les Dates* (1787), a new edition of Ducange's *Glossarium*, *De Re Diplomatica*, *Acta Sanctorum S. Benedicti* (9 vols. 1702), *Annales Ordinis S. Benedicti* (6 vols. 1739), *Gallia Christiana*, *Veterum Scriptorum Amplissima Collectio*, *Histoire Littéraire de France*, &c.

Mauritania, or MAURETANIA, the latter form that of the coins and inscriptions, was anciently the most north-western part of Africa, corresponding to the present Morocco and the western portion of Algiers. It derived its name from its inhabitants, the Mauri or Maurusii (see MOORS). It reached on the south to the Atlas Mountains, and was originally separated from Numidia on the east by the river Mulucha, now the Muluya, though at a later date it extended as far east as the Ampsaga. In ancient times it yielded great quantities of corn and valuable timber. See MOROCCO.

Mauritius, or ISLE OF FRANCE, an island in the Indian Ocean, belonging to Great Britain since 1810, and situated 550 miles E. of Madagascar. It is of volcanic origin and elliptical in shape. A girdle of reefs, broken only by passages opposite the mouths of the small streams, renders it somewhat difficult of approach. The contour rises rapidly into a tableland, that shoots up into ridges 500 to 2700 feet in height. Of individual peaks, Pouce (2650 feet) resembles the human thumb, Pieter Botte (2676), a sharp cone, supports a gigantic crag on its summit, and Rivière Noire (2711) is the culminating point of the island. Lavas

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and basalts abound, and volcanic lakes, as Grand Bassin, are not uncommon. During the French occupation (1715–1810) Mauritius, or, as they called it, Isle of France, was well wooded. Its picturesque beauty forms the appropriate background of Bernardin St Pierre's idyl, *Paul and Virginia*, and is well described in Besant and Rice's novel, *My Little Girl*. But during the 19th century the forests were cut down to make room for sugar-cane plantations. Consequently but little of the native flora remains. Most of that which now flourishes has been introduced. The more conspicuous trees and plants are the ebony-tree, cocoa-nut and other palms, bamboo, benzoin, ironwood, aloe, traveller's tree, and numerous tropical fruits, besides food plants, such as sugar, vanilla, coffee, cocoa, maize, rice, yams, manioc, &c. The existing fauna consists almost entirely of imported domestic animals. The extinct fauna embraced the interesting Dodo (q.v.), the rail called Aphanapteryx, and a short-winged heron. Fossil tortoises of great size have been discovered. The birds resemble those of Madagascar; and the neighbouring seas swarm with fish. Owing to the deforesting of the island the rainfall is uncertain. Though pleasant enough in the cool months, the climate is very hot during the rainy season (December to April or May), and terrific cyclones are common, though less common, it is believed, since the woods have been felled. At Port Louis the annual mean is 78° F.; but at Curepipe (pop. 7880), on the central plain of the uplands (1800 feet), the thermometer is generally 7° or 8° less, and the climate resembles that of the south of France. In 1854 the cholera carried off 17,000 people, and thirteen years later 30,000 perished of a malignant fever. The upper classes, very intelligent, cultured, and well educated, are mostly descended from the old French colonists, except that the government officials, with a few others, are English. There is a large number of half-castes, and a considerable body of Negroes, Malagasy, Singhalese, Malays, Chinese, &c. But the greater part of the population consists of coolies, who have been imported nearly every year since 1842 to work the sugar-fields. Pop. (1881) 359,874; (1889) 369,302, of whom 251,550 were Hindus. The people of European origin are mostly Roman Catholics (108,000); there are 8000 Protestants. The chief towns are Port Louis (q.v.), the capital, on the north-west coast; Curepipe, to which the government and merchants of the capital retire in the hot season; and Mahébourg (4490) on the south coast. This last town is connected by rail with both the preceding; the line then sweeps round northwards to the mouth of Grand River on the east coast. These, with a couple of branch-lines in the south, make a total of 92 miles. The one great crop of the island is sugar, which is exported to the value of £1,867,600 on an average every year. Rum also is exported to the annual value of £18,000, cocoa-nut oil to £5430, vanilla £14,340, whilst the export of aloe fibres (known in commerce as Mauritius hemp) has risen in value from £12,633 in 1886 to £46,057 in 1888. The total exports are valued at £2,189,820 (average of 5 years ending 1888), and the total imports at £1,500,825. Sugar, drugs, caoutchouc, &c., are exported to Great Britain to the annual value of £282,780 in return for cotton and iron goods, coals, machinery, and clothing, to the annual value of £290,225. The crown colony of Mauritius, with its dependencies the Seychelles Islands, Rodriguez, Diego Garcia, and several minor islands, is administered by a governor, aided by an executive council. There is also a Council of Government, consisting of the governor and twenty-seven members, of whom ten are elected (since the amended constitution of 1885 came into force), nine are appointed by the crown, and eight are *ex officio*. There is a military force of about 600 men and a police force of 700. Besides 144 primary schools, there is the Royal College (188 pupils in 1888), with a couple of preparatory schools attached. There is a Roman Catholic bishop of Port Louis, and a Protestant bishop of Mauritius. The island was discovered by Mascarenhas (whence it and the neighbouring islands are called the Mascarenes) in 1507; at that time it was uninhabited. The Portuguese having abandoned it after ninety years' possession, it was seized by the Dutch in 1598, who named it after their Prince Maurice (q.v.); but they in their turn abandoned it in 1710. It was the French governor Mahé de Labourdonnais (1735–46) who introduced the sugar-cane, and laid the foundation of its prosperity as a colony, during the French occupation. Theodore Hook was treasurer in 1812–18.

See works by Grant (1801), Flemyng (1862), Ryan (1864), Boyle (1867), J. G. Baker (1877), and G. Clark (1881).

Maurocordatos, or MAVROCORDATO, a Fanariote family, distinguished for ability and political influence, and descended from Greek merchants of Chios and Constantinople.—ALEXANDER MAUROCORDATOS (*circa* 1637–1709) studied medicine in Italy, and, having a talent for languages and diplomacy, became dragoman or interpreter to the Porte in 1681, and rendered valuable service in the negotiations with Austria of the immediately following years, his labours finding their culmination in the treaty of Carlovitz (1699). For some time after that he was one of a triumvirate in whose hands all power in the Ottoman empire rested.—His son, NICHOLAS (died 1730), was the first Greek who was hospodar of Moldavia and Wallachia.—CONSTANTINE, son of Nicholas, became hospodar of Wallachia in 1730, and abolished serfdom in that country.—His brother's grandson, ALEXANDER MAUROCORDATOS, born at Constantinople on 15th February 1791, took an active part in the Greek struggle for liberty, and prepared the declaration of independence and the plan of a provisional government, being himself elected president of the executive body. Then he undertook in 1822 an expedition to Epirus, which ended in the unsuccessful battle of Peta; but he saved the Peloponnesus by his resolute defence of Missolonghi (1822–23). Notwithstanding the opposition of Colocotroni and Dimitrios Ypsilanti, he laboured earnestly in the cause of Greek independence and union. But unpopularity dogged his efforts, because he was a steadfast admirer of English policy and institutions, and a fierce opponent of the pro-Russian government of Capo D'Istria. After the accession of King Otho, he was at different times cabinet-minister and ambassador of Greece at various courts. At the outbreak of the Crimean war he was placed once more at the head of the government—a dignity, however, which he soon resigned. He died at Ægina, 18th August 1865.

Maury, JEAN SIFFREIN, French orator and prelate, was born on 26th June 1746 at Valréas (dept. Vaucluse), and, his studies completed at Avignon, he went to Paris. Eloquent *éloges* on the dauphin, Charles V. of France, St Louis, St Vincent de Paul, and others gained him the abbacy of Frinade, and in 1784 admission to the Academy. In 1786 he was made prior of Lihons-en-Santerre, and in 1789 was sent by the neighbouring clergy to represent them in the States-general. Bold, confident, vehement, gifted with a magnificent voice and an imposing presence, and master of the resources of the skilled orator, Maury was the worthy rival of Mirabeau, and sometimes got the better of him in a parliamentary bout. At the

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dissolution of the Constituent Assembly, he withdrew from public life, and even from France. The pope, admiring his devotion to Louis XVI., summoned him to Rome, made him Archbishop of Nicæa *in partibus*, then cardinal (1794), and, besides bestowing upon him a valuable living, sent him as his nuncio to witness the coronation of the Emperor Francis II. In spite of his zeal for the Bourbons, Maury made his submission to Napoleon in 1804, and Napoleon in return appointed him grand almoner to his brother Jerome, and in 1810 chose him to be Archbishop of Paris. This step cost Maury the favour of the pope; that of the Bourbons he had of course already lost. He consequently died in disgrace on 11th May 1817. Maury wrote *Essai sur l'Éloquence de la Chaire* (2 vols. 1810), 'one of the best books in the language;' his *Œuvres Choisies* were published in 5 vols. in 1827. See Lives by his nephew, L. S. Maury (1827), Poujoulat (1835), and Ricard (1887); also Sainte-Beuve, *Causeries de Lundi*, vol. iv.

Maury, MATTHEW FONTAINE, an American naval officer, astronomer, and hydrographer, was born near Fredericksburg, Virginia, January 14, 1806. In 1825 he was appointed midshipman in the United States navy, and during a voyage round the world in the *Vincennes* commenced his well-known *Navigation* (1834), which was adopted as a text-book in the navy. After thirteen years' service he became lieutenant in 1837, but an accident two years later lamed him for life. He devoted himself to study and the promotion of naval reform, and in 1842 was appointed superintendent of the Hydrographical Office at Washington, and two years later of the observatory. Here he carried out a system of observations on winds and currents, which enabled him to write his *Physical Geography of the Sea* (1856), and to produce in 1844 his works on the Gulf Stream, Ocean Currents, and Great Circle Sailing. In 1855 he was promoted to the rank of commander, but resigned his commission on the secession of Virginia, became an officer of the Confederate navy, and as such was sent as commissioner to Europe. After the war he lived some time in Mexico, but finally accepted the chair of Physics in the Virginia Military Institute at Lexington, where he died February 1, 1873. He was a member of the scientific societies of Paris, Berlin, Brussels, St Petersburg, and may be considered almost as the founder of a new and important science. There is a Life by his daughter (New York and Lond. 1888).

Mausoleum, a sepulchral monument of large size, containing a chamber in which urns or coffins are deposited. The name is derived from the tomb erected at Halicarnassus to Mausolus, king of Caria, by his widow, Artemisia, in 353 B.C. It was esteemed one of the seven wonders of the world. Although apparently in good condition as late as the 12th century, it fell into decay during the following two centuries. The ruins were ransacked for building materials by the Knights of St John in the 16th century. The site was rediscovered in 1857 by Newton, who was instrumental in getting the remains carried to the British Museum (q.v., Vol. II. p. 463). The mausoleum consisted of a basement 65 feet high, on which stood an Ionic colonnade 23½ feet high, surmounted by a pyramid, rising in steps to a similar height, and on the apex of that stood a colossal group, about 14 feet in height, of Mausolus and his wife in the *quadriga;* these statues are supposed to have been the work of the celebrated Scopas. Later instances of large and magnificent mausoleums are Metella's tomb, Hadrian's (Castle of San Angelo), and that of Augustus at Rome, the mausoleum of Frederick-William III. and Queen Louisa at Charlottenburg near Berlin, that of the House of Hanover at Herrenhausen, of the Prince Consort at Frogmore in Windsor Park, of Napoleon III. at Farnborough, and of A. T. Stewart at Garden City (q.v.), in the United States. The neighbourhood of San Francisco is studded with the mausoleums of American millionaires, one instance being the Lick (q.v.) Observatory; while magnificent structures mark the burial-places of such prominent men as Lincoln, Grant, and Garfield. See BURIAL, and other articles referred to there.

Mauvaises Terres, or BAD LANDS. See DAKOTA, and WYOMING.

Mauve. See DYEING.

Maw-seed, a name by which poppy-seed is sold as food for cage-birds when moulting.

Maxim Gun. See MACHINE GUN.

Maximilian I., German emperor, the son of Frederick III., was born at Vienna-Neustadt, 22d March 1459. In his nineteenth year he married Mary, the heiress of Charles the Bold, Duke of Burgundy, whereby he acquired Burgundy and Flanders. But this involved him in war with Louis XI. of France, the French kings having for many years had covetous longings towards Flanders. After the early death of his wife (1482) Maximilian was forced to give Artois and the duchy of Burgundy to Louis. Nevertheless he continued to war against his enemy, in spite of the disaffection of his Flemish subjects. In 1486 he was elected king of the Romans. In 1490 he drove out the Hungarians, who, under Matthias Corvinus had seized (1487) great part of the Austrian territories on the Danube; and at Villach in 1492 he routed the Turks, who had been raiding in Carinthia, Carniola, and Styria. Charles VIII. of France having rejected Maximilian's daughter for Anne of Brittany, whose great possessions the emperor hoped to secure by marrying Anne himself, war was only averted by Charles ceding to his exasperated rival the county of Artois and Franche-Comté. On the death of his father in 1493, Maximilian became emperor. He subsequently married Bianca Sforza, daughter of the Duke of Milan, and turned his ambition towards Italy. But his schemes failed: after various changes of fortune, and years of war, he was compelled (1515) to give up Milan to France and Verona to the Venetians. Nor was he more successful against the Swiss, who in 1499 completely separated themselves from the German empire. The hereditary dominions of his house, however, were increased during his reign by several peaceful additions, chief amongst these being Tyrol; and the marriage of his son Philip with the Infanta Joanna united the houses of Spain and Hapsburg; whilst the marriage in 1521 of his grandson Ferdinand with the daughter of Ladislaus of Hungary and Bohemia, brought both these kingdoms to Austria. Two years after his accession the new emperor put an end to the intestine feuds of his nobles by proclaiming at Worms the Eternal Peace. He also improved the administration of justice by establishing the Imperial Tribunal and the Imperial Aulic Council, and by admirable police regulations. The empire was divided into six (afterwards ten) circles, each ruled by a separate governor. Maximilian greatly encouraged the arts and learning, and especially favoured the universities of Vienna and Ingolstadt, and caused at least two works to be written under his own personal direction, *Theuerdank* in verse and *Weisskunig* in prose, of both of which he himself is the hero. He died at Wels, in Upper Austria, 12th January 1519. Besides being excellently schooled in mental and artistic accomplishments, Maxi-

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milian was well versed in all bodily exercises; and these advantages were further enhanced by a kingly presence, a chivalrous disposition, and a genial manner, so that he has been called 'the first knight of his age.' Like Henry VIII. of England, he loved to take part in the popular games of archery, &c. See Lives by Klüpfel (1864) and Ulmann (1884), and a history of his reign by Hegewisch (1782).

Maximilian, EMPEROR OF MEXICO. Ferdinand Maximilian Joseph, Archduke of Austria, was born on July 6, 1832, and was the son of the Archduke Francis-Charles, and the younger brother of Francis-Joseph I. He became an admiral of the Austrian navy, and in 1857–59 he was popular as governor of the Lombardo-Venetian territory. In 1862 the French were induced to interfere in the affairs of Mexico, and in 1863 called together an Assembly of Notables, which offered the crown of Mexico to Maximilian. After deliberation he solemnly accepted it; and in June 1864 he entered Mexico. For a time all went well; but he vainly tried to reconcile the Mexican parties. Juarez (q.v.) again raised the standard of independence; and soon after (1866) Louis Napoleon had to contemplate the withdrawal of his troops. In vain the Empress Charlotte, a daughter of Leopold I. of Belgium, went to Europe to enlist support for her husband; her reason gave way under the continued grief and excitement brought on by disappointment. The French were most anxious that Maximilian should leave with their troops; but he felt bound as a man of honour to remain, and share the fate of his followers. At the head of 8000 men he made a brave defence of Queretaro against a Liberal army under Escobedo. In May 1867 he was betrayed and tried by court-martial, and on July 19 he was shot. His body was conveyed to Europe in an Austrian frigate. His death was directly due to his own fatal edict of October 3, 1865, that all Mexicans taken in arms against the empire should be shot without trial. After the death of Maximilian, his writings were published under the title of *Aus Meinem Leben; Reiseskizzen, Aphorismen, Marinebilder* (7 vols. 1867). See MEXICO.

Max-Müller, FRIEDRICH, philologist, was born at Dessau, in the duchy of Anhalt-Dessau, 6th December 1823. His father, Wilhelm Müller, distinguished not only for his worth as a man and his extensive and thorough scholarship, but as one of the first German lyric poets, was librarian of the ducal library, but died prematurely, October 1827. Max-Müller received the elements of his education at Dessau, and then went to Leipzig, where he studied Greek and Latin under Hermann and Haupt, and took his degree in 1843. He began the study of Sanskrit under Professor H. Brockhaus, and soon chose it as his special pursuit. The first fruits of his labours appeared in a translation of the *Hito padesa* (Leip. 1844). In 1844 he went to Berlin to study under Bopp and Schelling, and consult the Sanskrit MSS. to be found there. In Paris, whither he repaired in 1845, he began, at the instigation of Burnouf, to prepare for an edition of the Rig-Veda, with the commentary of Sâyanâcârya. With this view he came to England, June 1846, to examine the MSS. in the East India House, London, and the Bodleian Library at Oxford; and, on the recommendation of Professor H. H. Wilson, the East India Company commissioned him (1847) to edit the Rig-Veda at their expense (6 vols. 1849–74; new ed. 1890). In 1850 Max-Müller was appointed Deputy Taylorian professor of Modern Languages at Oxford; in 1854 he succeeded to the professorship; and in 1858 he was elected a Fellow of All Souls. While pursuing his labours connected with the Rig-Veda, Max-Müller has published treatises on a variety of philological topics, which have done more than the labours of any other single scholar to awaken in England a taste for the science of language in its modern sense. Inheriting the poetic imagination and fire of his father, Max-Müller has at command such a felicity of illustration that subjects dry under ordinary treatment become in his hands attractive. He has published a translation into German of Kâlidâsa's *Megha-dûta* (1847); *The Languages of the Seat of War in the East* (1854); *Comparative Mythology* (1856); *History of Sanskrit Literature* (1859); Lectures on *The Science of Language* (1861–63); Lectures on *The Science of Religion* (1870). Other works were *Chips from a German Workshop* (4 vols. 1868–75), the Hibbert Lectures on *The Origin and Growth of Religion* (1878), *Selected Essays* (1881), and *Biographical Essays* (1883). A novel written in German, *Deutsche Liebe*, which has gone through many editions, is attributed to him. He is editor of the important series of *The Sacred Books of the East*. In 1888 he delivered at Glasgow University the first series of Gifford Lectures, which were published in 1889 under the title of *Natural Religion;* and a second course was delivered by him in 1890. He is one of the eight foreign members of the Institute of France, and one of the twenty knights of the Ordre pour le Mérite. He has received the degree of LL.D. from Cambridge, Edinburgh, and Bologna.

Maxwell, JAMES CLERK-, one of the greatest of modern natural philosophers, was the only son of John Clerk-Maxwell of Middlebie, in Dumfriesshire, and was born at Edinburgh, June 13, 1831. He was educated in boyhood at the Edinburgh Academy. His first published scientific paper was read for him by Professor Forbes to the Royal Society of Edinburgh before he was fifteen. He spent three years at the university of Edinburgh; and during this period he wrote two valuable papers, 'On the Theory of Rolling Curves,' and 'On the Equilibrium of Elastic Solids.' He went to Cambridge in 1850, obtained in 1854 the position of second wrangler, and was declared equal with the senior wrangler in the higher ordeal of the Smith's prize. In 1856 he became a professor in Marischal College, Aberdeen, and in 1860 in King's College, London. He had been successively Scholar and Fellow of Trinity, and was elected an Honorary Fellow of Trinity when he finally became in 1871 professor of Experimental Physics in the university of Cambridge. He died November 5, 1879.

The great work of his life is his treatise on *Electricity and Magnetism* (2 vols. 1873). His great object was to construct a theory of electricity in which 'action at a distance' should have no place; and his success was truly wonderful. There can be little doubt that he succeeded in laying the basis of a physical theory of electric and magnetic phenomena, quite as securely founded as is the undulatory theory of light (see *Nature*, vol. vii. p. 478). Another subject to which he devoted much attention was the perception of colour, the three primary colour-sensations, and the cause of colour-blindness. He was the first to make colour-sensation the subject of actual measurement. He obtained the Adams prize for his splendid discussion of the dynamical conditions of stability of the ring-system of Saturn. But he was perhaps best known to the public by his investigations on the kinetic theory of gases. His Bradford 'Discourse on Molecules' is a classic in science. Besides a great number of papers on various subjects, mathematical, optical, dynamical, he published an extraordinary text-book of the *Theory of Heat* and an exceedingly suggestive little treatise on *Matter and Motion*. In 1879 he edited, with copious and very valuable original

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notes, *The Electrical Researches of the Hon. Henry Cavendish*. He took a prominent part in the construction of the British Association Unit of Electrical Resistance, and in the writing of its admirable reports on the subject; and he discovered that viscous fluids, while yielding to stress, possess double refraction. He was excessively ingenious in illustration, especially by means of diagrams, and possessed a singular power of epigrammatic versification. Some of his last and very best scientific work adorns and enriches the ninth edition of the *Encyclopædia Britannica*. He was, in the full sense of the word, a Christian. His *Scientific Papers* were edited by W. D. Niven (8 vols. Camb. 1890); and his Life has been written by Lewis Campbell and William Garnett (1882).

Maxwell, Sir William Stirling-, the son of Archibald Stirling of Keir, in Perthshire, was born at Kenmure House, near Glasgow, in 1818. Having graduated from Trinity College, Cambridge, in 1839, he spent some time travelling in Italy and Spain, one outcome of which was *Annals of the Artists of Spain* (3 vols. 1848). He always retained his interest in Spanish subjects: in 1852 was published from his pen *Cloister Life of the Emperor Charles V.*, in 1855 *Velazquez and his Works*, in 1856 *Notices of the Emperor Charles V. in 1555 and 1556*, and in 1883 the sumptuous *Don John of Austria* (previously printed for private circulation). He also issued privately several other books, got up in a very sumptuous style, some dealing with Charles V. and two with the anatomist Vesalius. In 1866 he succeeded to the baronetcy and estates of his uncle, Sir John Maxwell of Pollok, adding the name of Maxwell to his own patronymic. Sir William's second wife (1877) was the Hon. Mrs Norton (q.v.). Besides representing Perthshire as a Conservative from 1852 to 1867, and again in 1872, he was a trustee of the British Museum and the National Portrait Gallery, and was chosen Lord Rector of St Andrews in 1863, of Edinburgh in 1871, and in 1875 Chancellor of Glasgow University. He died at Venice on 15th January 1878. A new edition of his Works was published in 6 vols. in 1891.

May. From a primitive period the revival of vegetation, which marks nature at this period, has been celebrated with various ceremonies. Hence the first of May has from time immemorial been a gala day in Britain, although like most of the festivals of the calendar it has suffered from the hand of time. It is no doubt a survival of the Floralia of the Romans, who in their turn, it has been suggested, derived their festival from India. The anniversary is still kept up by the Italians under the title of 'Calendi di Maggio;' young people sallying forth at daybreak to collect boughs with which to decorate the doors of their relatives and friends. A remnant of the May festival, as observed by the Druids, survives in the fires formerly lighted on this occasion—the day having been called by the Irish and the Scotch Highlanders *Bealtine* or *Beltane* (q.v.). In England, as we learn from Chaucer and Shakespeare and other writers, it was customary during the middle ages for all, both high and low—even the court itself—to go out on the first May morning at an early hour 'to fetch the flowers fresh.' Hawthorn (q.v.) branches were also gathered; these were brought home about sunrise, with accompaniments of horn and tabor and all possible signs of joy and merriment. The people then proceeded to decorate the doors and windows of their houses with the spoils. By a natural transition of ideas they gave the hawthorn bloom the name of the 'May;' they called the ceremony 'the bringing home the May;' they spoke of the expedition to the woods as 'going a-Maying.' The fairest maid of the village was crowned with flowers as the 'Queen of the May,' and placed in a little bower or arbour, where she sat in state, receiving the homage and admiration of the youthful revellers, who danced and sang around her. How thoroughly recognised, too, the May-day games, with the accompanying morris-dance, became in England may be illustrated by the fact that in the reign of Henry VIII. the heads of the corporation of London went out into the high grounds of Kent to gather the May—the king and his queen, Catharine of Aragon, coming from their palace of Greenwich, and meeting these respected dignitaries on Shooter's Hill. Another conspicuous feature of these festive proceedings was the erection in every town and village of a fixed pole—called the Maypole—as high as the mast of a vessel of 100 tons, on which each May morning they suspended wreaths of flowers, and round which the people danced in rings pretty nearly the whole day; the earliest representation of an English Maypole being that reproduced in the *Variorum Shakespeare*, as depicted on a window at Betley, in Staffordshire. A severe blow was given to these merry customs by the Puritans, who caused Maypoles to be uprooted, and a stop put to all their jollities. They were, however, revived after the Restoration, and held their ground for a long time; but they have now almost disappeared. In France and Germany too, Maypoles were common, and in some places are still to be seen, and festive sports are even yet observed. See Chambers's *Book of Days*, vol. i. pp. 569–582. With Catholics, since 1815, the month of May has been specially celebrated as the Virgin's month; and in Scotland, from some time at least before Mary's marriage to Bothwell (1567), as long before with the Romans, it has been deemed an unlucky month to marry in.

May, Isle of. See Forth.

May, Thomas, dramatist and historiographer, was the son of Sir Thomas May of Mayfield in Sussex, and was born in 1594. Educated at Cambridge, he became a member of Gray's Inn and a courtier. He produced several dramas (*Antigone*, *Cleopatra*, *Agrippina*, &c.) and comedies, poems, and translations of the Georgics and Lucan's *Pharsalia*. During the Civil War he was made secretary and historiographer to the Parliament, and in that capacity produced a *History of the Parliament of England, 1640–1643* (1650; several times republished), and a *Breviary* of the same history (1650). He died 13th November 1650.

May, Sir Thomas Erskine, Baron Farnborough, born in 1815, was educated at Bedford School, became assistant-librarian of the House of Commons in 1831, clerk-assistant in 1856, and clerk of the House in 1871. He was called to the bar in 1838, was made in 1860 Companion, in 1866 Knight Commander of the Bath, and shortly after his retirement from office in 1886 was raised to the peerage as Baron Farnborough, but died on 18th May of that year. His most important works are *A Treatise on the Law, Privileges, Proceedings, and Usage of Parliament* (1844), which, acknowledged as the parliamentary text-book, had gone through six editions before his death and been translated into German and Hungarian; *Constitutional History of England since the Accession of George III., 1760–1860* (1861–63; 3d ed., with supplementary chapter, 3 vols. 1871), a continuation of Hallam's work to our own times, and of which French and German translations have appeared; and *Democracy in Europe: a History* (2 vols. 1877), a work characterised by great learning and impartiality.

Mayas. See American Indians.

Maybole, a town of Ayrshire, 3¾ miles inland, and 9 by rail S. by W. of Ayr. In feudal times

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the capital of Carrick, and a burgh of barony since 1516, it is an old-world place, which once boasted twenty-eight baronial mansions, several of which still remain; besides which, it has a new town-hall (1887) and a fine Roman Catholic church (1879). Shoemaking is the staple industry. The famous abbey of Crossraguel (q.v.) is in the vicinity. Pop. (1851) 3862; (1881) 4494.

Mayence. See MAINZ.

Mayenne (Lat. *Meduana*), a French department formed out of the old provinces of Maine and Anjou, now containing the arrondissements of Laval, Château-Gontier, and Mayenne, has an area of 1996 sq. m. and a pop. of (1872) 350,637; (1886) 340,063. The valleys of the Mayenne, Vilaine, and Sarthe are fairly fertile, and yield wheat, barley, flax, potatoes, hemp, and fruit (especially apples for cider). Cattle-breeding, coal and slate mining, and cotton spinning and weaving are the other chief industries. Chief-town, Laval.—The *river* Mayenne, after a course of 127 miles in a southerly direction, joins the Sarthe at Angers to form the Maine, a tributary of the Loire. It is navigable up to Laval.—The *town* of Mayenne, on the river Mayenne, 78 miles by rail S. by W. of Caen, has a picturesque ruined castle (taken by the English in 1424), steep narrow streets, and manufactures of calico and linen. Pop. (1872) 8790; (1886) 9940.

Mayer, JULIUS ROBERT VON, physicist, was born at Heilbronn, 25th November 1814, studied medicine at Tübingen, Munich, and Paris, began life as a ship's surgeon, and settled in his native town to practise his profession in 1841. Whilst at Batavia in 1840 his attention was first attracted to the studies he afterwards pursued in every interval of leisure. In 1842 he published in Liebig's *Annalen* a preliminary statement of the mechanical theory of heat, in which he clearly determined the numerical relation between heat and work. Three years later he restated his views with admirable clearness and with a great wealth of illustration, and at the same time gave a forecast of his theory of the meteoric origin of the sun's heat, elaborated in 1848. Contemporaneously with Mayer the mechanical theory of heat was worked out independently by Joule (q.v.) in England. Nevertheless a controversy arose as to the priority of discovery. The Royal Society gave him the Copley medal in 1871, and he was ennobled by the king of Würtemberg two years before his death, on 20th March 1878. Mayer's papers were collected under the title *Mechanik der Wärme* (2d ed. 1874), and his *Correspondence* appeared in 1889. See Tyndall's paper in *Nature* (vol. v., and cf. vol. xvii.), and monographs by Dühring (1879) and Weyrauch (1889).

May-fly. See EPHEMERA.

Mayhem. See ASSAULT.

Mayhew, AUGUSTUS (1826–75), author, wrote in conjunction with his brother Henry ('the Brothers Mayhew') several notable works of humorous fiction, the best of which are named in the article below. In addition to this, the better-known part of his work, he wrote several stories which were popular at the time—*Paved with Gold* (1857), *The Finest Girl in Bloomsbury* (1861), *Faces for Fortunes* (1865), &c.

Mayhew, HENRY, journalist and littérateur, was born in London in November 1812. He ran away from Westminster School in consequence of unjust treatment, was sent on a voyage to Calcutta, and on returning was articled to his father, a solicitor. Mayhew's first adventure in literature was the starting, in conjunction with Gilbert à Beckett, of *The Cerberus*, the production of which was stopped by A Beckett's father. The two youths in disgust left their homes, and with but fifteen shillings between them walked to Edinburgh, hoping to make fortunes there as actors and authors at the theatre of which Mayhew's brother Edward was lessee; this failed, for they were at once sent back. In 1831 they started *Figaro in London*, and the year following *The Thief*, which was the prototype of the 'Bits' journals of to-day. In 1841 Mayhew produced *The Wandering Minstrel*, a farce, and shortly after joined with his brother Augustus in one of the most successful of literary partnerships, during which (as 'the Brothers Mayhew') they produced some remarkably clever works of fiction, the best of which are *The Good Genius that turned Everything to Gold* (1847), *The Greatest Plague of Life* (1847), *The Image of His Father* (1848), *Whom to Marry* (1848), *The Magic of Kindness* (1849), *Living for Appearances* (1855). One of the originators and first editor of *Punch*, Mayhew was from early in the 'forties' a voluminous writer on many subjects—as on *The Peasant Boy Philosopher* (1854), *The Wonders of Science* (1855), *Shops and Companies of London* (1865), *London Characters* (1874), and the *Criminal Prisons of London*. The work by which Mayhew will perhaps be best remembered is his great *London Labour and the London Poor* (1851, &c.). Henry Mayhew, who had married in 1844 the elder daughter of Douglas Jerrold, died on July 25, 1887.—HORACE MAYHEW (1816–72), brother of the two foregoing, also made some mark in literature, more especially of a humorous and ephemeral kind. He was a constant contributor to *Punch*, of which he was at one time sub-editor.

Maynooth', a village of County Kildare, Ireland, 15 miles NW. of Dublin by rail; pop. (1881), including the college, 1174. It is of historical interest as the seat of the Geraldines, of whose castle striking ruins still remain; and as the scene of more than one struggle with the English power, especially the 'Rebellion of Silken Thomas,' in the reign of Henry VIII., and in the war of the Confederates (1641–50). But its chief modern interest arises from its Roman Catholic college, established (1795) by an act of the Irish parliament during Pitt's ministry, to meet a necessity created by the destruction, through the French Revolution, of the places of education in France, upon which the Irish Catholic clergy, excluded by the penal laws from the opportunity of domestic education, had been driven to rely. The original endowment, an annual vote of £8928, was continued, although not without controversy and keen opposition on the part of zealous Protestants, by the imperial parliament after the act of union. In the year 1846 Sir Robert Peel carried a bill for a permanent endowment of £26,000 a year, to which was added a grant of £30,000 for building purposes. The building erected under the original endowment is a plain quadrangle. The new college is a very striking Gothic quadrangle by Pugin, containing professors' and students' apartments, lecture-halls, and a singularly fine library and refectory.

Under the Act of 1845 the college was to receive 500 students, all destined for the priesthood. The patronage of the 500 studentships was divided in the ratio of population among the bishops of the several sees of Ireland; the candidates were subjected, before matriculation, to a comprehensive entrance examination. The full collegiate course was of eight years, two of which were given to classics, two to philosophy, and the remaining four to divinity, scripture, church history, canon law, and the Hebrew and Irish languages. The divinity students, 250 in number, received a money stipend of £20 annually; and at the close of the ordinary course, 20 'Dunboyne Scholarships' were assigned

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by competition to the most distinguished students, and might be held for three years. The legislative authority was vested in a board of seventeen trustees, and the internal administration in an academical body, consisting of a president and vice-president, together with a numerous body of professors and deans. Of a board of eight visitors, five were named by the crown, and three elected by the trustees.

In 1869, by the Irish Church Act, the Maynooth endowment was withdrawn—a capital sum, fourteen times its amount, being granted to the trustees for the discharge of existing interests. The college, however, is still maintained on the same footing; and although the number of pupils, owing to the suspension of free studentships and exhibitions, fell off somewhat for the few years immediately succeeding the disendowment, the diminution was only temporary. In recent years the average number of students in residence has been 500. The visitorial powers created under the act of parliament are now exercised by visitors appointed by the trustees, and all state connection is at an end. The college also possesses some landed and funded property, the result of donations and bequests, the most considerable of which is that of Lord Dunboyne, Roman Catholic Bishop of Cork. The new chapel, originally included in the design supplied by Pugin in 1846 for the new college, was (with the exception of a tower and spire 275 feet high) completed at the cost of £50,000, and dedicated in 1890. Designed by the late J. J. M'Carthy in the Decorated Gothic style, it consists of a great nave, choir, and sanctuary, ending in a five-sided apse, from which radiate five chapels. The entire length is 220 feet, the width 40 feet, the height from floor to groined ceiling 70 feet. The sides of the chapel are flanked by cloisters which exteriorly present the appearance of aisles. The interior is richly fitted as a collegiate chapel, with 450 choir-stalls of finely-carved oak, mosaic pavements of varied devices, altars of Carrara marble, rich painted glass, and a sweetly-toned organ, built on the electro-pneumatic principle. A great part of the college buildings was burned in November 1878, but has since been restored.

Mayo, a maritime county of the province of Connaught, Ireland, is bounded on the N. and W. by the Atlantic Ocean, E. by Sligo and Roscommon, and S. by Galway. Area, 1,360,731 acres, of which nearly 26 per cent. is bog and 18 per cent. barren. Of the remainder 168,149 acres were under crop in 1888 (cereals 55,687 acres, and green crops 61,263, including 48,089 acres of potatoes), 39,857 laid down to permanent pasture, and 11,240 sown with clover, sainfoin, &c. Pop. (1841) 388,887; (1861) 254,769; (1881) 245,212, of whom 238,262 were Roman Catholics and 5575 Protestant Episcopalians. The rearing of cattle and agriculture are the leading industries. The eastern half of the county is more or less a plain, the western half mountainous, the highest points being Muilrea (2688 feet), Nephin (2530), and Croagh Patrick (2370). Ironstone abounds, but owing to want of fuel is not worked; and there are several valuable slate-quarries. The chief towns are Castlebar (3885), Westport (4469), Ballina (5760, including 1442 in County Sligo), and Ballinrobe (2286). The coast-line of Mayo is about 250 miles, and is greatly indented, Killala, Blacksod, and Clew Bays, Killary Harbour, and Broad Haven being on this coast. Off Mayo, too, lie the islands Achil (35,283 acres), Clare (3959), and others. Loughs Mask and Corrib lie on the southern border, and Loughs Conn, Castlebar, Cullen, Carragh, Corramore within the county. A valuable salmon-fishery exists in the river Moy, and Lough Mask is the home of the 'gillaroo' trout. The Irish language was in 1881 spoken by 8808 persons who did not know English, and by 138,930 who did. Four members are returned to the House of Commons.

Mayo formed part of the extensive territory granted by King John to Hubert de Burgh; but William, the third earl, seizing Galway and Mayo, threw off the English allegiance and adopted the 'customs of the Irish,' together with the Celtic name of Mac-William. The district was not subdued until 1586. The antiquities of Mayo are chiefly ecclesiastical, there being many ruins of monasteries. Four round towers exist, and at Cong the remains of a splendid abbey of the 12th century. The celebrated 'Cross of Cong,' now in the museum of the Royal Irish Academy, was made at Roscommon in 1120.

Mayo, Richard Southwell Bourke, Earl of, Indian statesman, was born in Dublin on 21st February 1822, and educated at Trinity College, Dublin. He entered the House of Commons as a Conservative in 1847, and was appointed Chief-secretary of Ireland by Lord Derby in 1852, 1858, and 1866. In 1868 he was sent out to succeed Lord Lawrence as Viceroy of India. He discharged the duties of his office with earnest zeal and uniform courtesy, maintained friendly relations with the neighbouring states, treated the feudatory princes and the native people with impartial justice tempered by great kindness, and effected considerable improvements in the economic management of the Indian government, in gaol discipline, in irrigation works, and in providing educational facilities for the native Mohammedan population. Whilst inspecting the convict settlement at Port Blair on the Andaman Islands, on 8th February 1872, he was fatally stabbed by a Punjab fanatic. See Life by Sir W. W. Hunter (2 vols. 1875).

Mayonnaise, a thick cold sauce for salads, cold meat, poultry, fish, vegetables, &c., made of the yolk of eggs, salad-oil, and vinegar, with a little salt, cayenne pepper, and meat-jelly; it is sometimes coloured red with powdered lobster coral, or green with spinach or parsley.

Mayor (Fr. *maire*, Lat. *major*; see Major), originally a steward, bailiff, or overseer, thence the chief-magistrate of a city or corporate town in England or Ireland. The mayor is the head of the local judicature, and the executive officer of the municipality; he is elected by the council from the aldermen or councillors, and holds office for a year only. His duties include those of returning officer in all boroughs except those cities and towns which, being counties of themselves, have sheriffs of their own. The first Mayor of London was appointed in 1189, the first Mayor of Dublin in 1409. The mayors of London, York, and Dublin are called 'Lord Mayor.' The Lord Mayor of London has the title of 'Right Honourable'—which, along with the title 'Lord,' was first allowed by Edward III. in 1354—is the representative of royalty in the civil government of the city, the chief-commissioner of lieutenancy, the conservator of the river Thames, and on the demise of a sovereign is summoned to attend the Privy-council. To sustain the hospitality of the city he receives an allowance of £8000 a year, with the use of the Mansion House (q.v.), furniture, carriages, &c. He is chosen by the Livery (q.v.) on the 29th September, being commonly the senior alderman who has not already 'passed the chair.' Although the office is still one of dignity, it is only in the eyes of foreigners that the Lord Mayor of London is one of the most important public functionaries of the realm. The Mayor of Dublin was first styled Lord Mayor by Charles II. in 1665. The title of Mayor is used to denote the chief officer of a city in the

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United States and the British colonies. In France the Maire is first officer of a town, commune, or district. For the Mayor of the Palace, see PEPIN. See also PROVOST.

Mayotte, one of the Comoro Isles (q.v.).

Maysville, capital of Mason connty, Kentucky, on the Ohio River, 69 miles by rail NE. of Lexington. It is the river-port of a rich territory, and contains many mills, distilleries, &c. Pop. 5220.

Mayweed, or Stinking Camomile (q.v.).

Mazamet, a town in the French department of Tarn, on the Arnette, 43 miles ESE. of Toulouse, and 12 by rail SSE. of Castres. It has extensive woollen manufactures. Pop. 10,939.

Mazanderan, a province of northern Persia, fringing the Caspian Sea for some 200 miles and lying between the provinces of Ghilan and Astrabad, consists of a belt of low marshy coast-land, 10 to 20 miles wide, backed by the well-wooded northern slopes of the Elburz. The climate is very changeable, in summer both rainy and unhealthy, but on the uplands fairly salubrious. Owing to the fertility of the soil, which is watered by numerous small rivers, the Persians call the province the 'Garden of Iran.' Rice, wheat, and other cereals, cotton, mulberry-trees, and a variety of fruits are produced. Horses, asses, and camels are extensively bred. Area of province, 10,400 sq. m.; pop. 300,000. The chief town is Sari, though Barfurush (see BALFRUSH) is the seat of the trade with Russia. Iron ores and mineral oils are very abundant.

Mazarin, JULES (*Giulio Mazarini*), cardinal and chief-minister of France during the minority of Louis XIV., was born 14th July 1602, at Piscina in the Abruzzi. He studied under the Jesuits at Rome, and later at Alcala in Spain, where he relieved the tedium of study with love-making. He next entered the military service of the pope, but his ability for diplomacy was early recognised. Having accompanied a papal legate to the court of France, he became known about 1628 to Richelieu, who divined his promise and engaged him to maintain French interests in Italy, which he did while still employed by the pope as vice-legate to Avignon (1632), and nuncio to the French court (1634–36). In 1639 he openly entered the service of Louis XIII. and was naturalised a Frenchman; and two years later he received a cardinal's hat through the influence of Richelieu, who before his death (4th December 1642) recommended Mazarin to the king as his successor. His position was one of great difficulty amid the intrigues and jealousies of the time, and the first necessity was that he should make himself indispensable to the queen, who became regent on her husband's death in May 1643. But Mazarin was one of the most supple courtiers that ever bowed the knee before a throne, and moreover he knew how to touch a woman's heart by his romantic devotion. So he kept his place as minister, and it is certain, from his famous *carnets* and many of the Brühl letters, that the queen gave him her love, if it cannot with certainty be proved that there was a private marriage between them. It should be remembered that this was perfectly possible, for M. Chéruel has discovered that the cardinal had never taken more than the minor orders, of which a man could easily divest himself. Mazarin possessed admirable faculty for affairs and so much personal charm that he ruled with greater smoothness than Richelieu, although with almost as unlimited a sway. The parliament, thinking to regain political power, resisted the registration of edicts of taxation; but Mazarin caused the leaders of the opposition to be arrested (August 1648), upon which the disturbances of the Fronde (q.v.) began. The court retired to St Germain, but at length triumphed by the aid of Condé, and the truce of Ruel, while it removed the obnoxious taxes, left Mazarin and his subordinates in office. The hatred against him, however, blazed out anew in the provinces, when at his instigation the queen-regent arrested Condé, Conti, and Longueville in January 1650. Mazarin triumphed at Réthel, but soon had to succumb to the strength of the combination against him and retire to exile at Brühl. Meantime the press teemed with pamphlets and satires against him —the famous *Mazarinades*, few of which, however, attained the dignity of literature. The cardinal now perceived the fatal consequences of his policy of isolating himself and the queen from every party in the state, and bent all his masterly powers of intrigue to form a new royal party. Turenne was gained over, and his military genius proved more than adequate as a counterpoise to the opposition of Condé. After one year's absence Mazarin returned to court in January 1652, but eight months later again retired to Sedan to admit of a reconciliation with the *parlement* of Paris. At length in February 1653 he returned in triumph to Paris, and thereafter his power remained secure, while he quickly regained all his popularity. Under his rule the influence of France abroad was greatly increased. He gained the alliance of Cromwell at the price of Dunkirk; secured the preponderance of French influence in southern Germany by the treaty of Westphalia (1648), and the league of the Rhine, formed in 1659; and by the treaty of the Pyrenees (November 7, 1659), and the marriage of Louis XIV. with the Infanta Maria Theresa, brought the succession to the throne of Spain within the range of French ambition. Mazarin died at Vincennes, 9th March 1661, leaving an immense fortune, variously stated at from 18 to 40 million livres. His magnificent library, which had long been placed freely at the disposal of the public, was bequeathed to the Collége Mazarin. His name survives characteristically in the 'Mazarin Bible,' one of the most priceless treasures of Bibliomania (q.v.).

His celebrated nieces whom he brought from Italy to the French court present all the possible contrasts of character and destiny. The eldest of the seven, the virtuous Laura Mancini, married the Duc de Mercœur, son of Henry IV. and Gabrielle, and died young. Anne-Marie Martinozzi, her cousin, married the Prince de Conti, an austere and gloomy hunchback, and also died young. Laura Martinozzi mounted a throne by marrying the Duke of Modena, and became mother of the second queen of James II. of England. Olympe Mancini, who became Comtesse de Soissons, was a woman formed for great crimes, whose true place would have been in the palace of the Cæsars or the Vatican of the Borgias. She plunged deep into a series of discreditable intrigues, and found herself obliged to flee from France to escape the punishment of a poisoner. After flitting awhile like an evil genius over the face of Europe, she died poor and obscure at Brussels. Hortense Mancini, the most beautiful of the seven, and her uncle's favourite, inherited his fortune, and was sought in marriage by the Duke of Savoy, the Prince of Portugal, and the King of England. The cardinal married her to the Duc de la Meilleraie, who took the name and arms of Mazarin. He was a gloomy bigot, who mutilated with the fury of a Byzantine iconoclast the magnificent antique statues which Mazarin had collected with all an Italian's love for art, shut up his wife, and treated her with a jealous severity which afforded in the morality of the time ample justification for her misconduct. She found at once a refuge from his pursuit in England, and a characteristic recreation in an intrigue with Charles II. Marie-Anne Mancini became Duchesse

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de Bouillon, and was the generous patroness of Lafontaine and other men of letters. Her reputation was not spotless, but her wit brought her off triumphant from an examination for sorcery before the Chambre Ardente which her sister could not face. Marie Mancini, the least beautiful of the seven, was beloved by Louis XIV., who would have married her but for the self-denying opposition of his great minister. She found shelter but not consolation in the arms of Prince Colonna, one of the jealous husbands of old Italian story. She fled from his severity to Provence, to Flanders, and to Spain, but was at length secured and subdued into submission.

See the *Mémoires* of such contemporaries as De Retz, Madame Motteville, La Rochefoucauld, Turenne, Grammont, and Basin's *Hist. de France sous Louis XIII. et sous le Card. Mazarin* (4 vols. 1846); but especially the following works which have superseded all others: Chéruel's *Hist. de France pendant la Minorité de Louis XIV.* (4 vols. 1879–80), and its sequel, *Hist. de France sous le Ministère de Card. Mazarin* (2 vols. 1881–82), also Chéruel's edition of the *Lettres du Card. Mazarin pendant son Ministère* (4 vols. 1879–87). Other books that may be read are Cousin's *Jeunesse de Mazarin* (1865), Renée's *Les Nièces de Mazarin* (1856), and Gustave Masson's *Mazarin* (1886) in the 'Home Library' series. The Mazarinades were enumerated by Moreau in his *Bibliographie des Mazarinades* (3 vols. 1850–51; containing a list of no fewer than 4082), and collected in *Choix de Mazarinades* (2 vols. 1853).

Mazarron, or ALMAZARRON, a seaport town of Spain, 27 miles WSW. of Cartagena. Pop. 11,002.

Mazatlan', a fortified seaport of Mexico, at the entrance of the river Mazatlan, which falls into the Gulf of California, 230 miles SE. of Sinaloa. It is a well-built and picturesque town, the houses nearly all of one story, and possesses a cathedral, custom-house, barracks, a cotton factory, foundries, &c. The chief exports are gold and silver, archil, and mother-of-pearl. Pop. (1880) 17,395.

Mazeppa, IVAN STEPHANOVICH, hetman of the Cossacks, was born in 1644, descended of a poor but noble family of Podolia. He became a page at the court of John Casimir, king of Poland. A Polish nobleman, having surprised him in an intrigue with his wife, caused him to be stripped naked, and bound upon his own horse, lying upon his back, and with his head to its tail, and let the animal loose, leaving Mazeppa to his fate. The horse carried him, senseless from exhaustion, to its native wilds of the Ukraine, according to the usual account. A more credible story is that his horse carried him through woods and thickets and brought him back torn and bleeding to his own home. Mazeppa now joined the Cossacks, became secretary to their hetman, Samoilovich, and in 1687 was elected his successor. He won the confidence of Peter the Great, who loaded him with honours, and made him Prince of the Ukraine; but, on the curtailment of the freedom of the Cossacks by Russia, Mazeppa conceived the idea of throwing off the sovereignty of the czar, and for this purpose entered into negotiations with Charles XII. of Sweden. His treason was revealed to Peter the Great, who long refused to credit it, but after Pultowa ordered his effigy to be hanged upon the gallows, and his capital, Baturin, to be razed to the ground. Mazeppa's hopes perished in the disaster of Pultowa (1709), and he fled with Charles to Bender, where he died miserably the same year. His story is the subject of a famous poem by Byron, of a novel by Bulgarin, and a drama by Gottschall, of two paintings by Vernet, and of a masterly historical work by Kostomaroff (1882).

Mazurka, a lively Polish round dance, the music of which is generally in $\frac{3}{4}$ time. The peculiarity of the rhythm, which has a pleasing effect, is what characterises the music of the Mazurka. It is danced by four or eight couples, and is much practised in the north of Germany, as well as in Poland, from whose province Masovia it gets its name.

Mazzara, a walled cathedral city of Sicily, 32 miles by rail S. of Trapani, stands in a fine plain on the seashore. Pop. 13,074.

Mazzarino, a town of Sicily, 15 miles SE. of Caltanisetta. Pop. 12,964.

Mazzini, GIUSEPPE (English, JOSEPH), Italian patriot and republican, was born at Genoa, 22d June 1805. A clever, precocious boy, he began to study at the university of his native town when only thirteen, and before he was nineteen was practising as an advocate. In April 1821 his heart was deeply stirred and his imagination fired through seeing refugees from the unsuccessful rising in Piedmont, and from that moment he conceived the idea of the liberation of his country. At first he assailed the domination of the classical school of literature, and its 'monarchical' tyranny of rule and prescription. But the earnestness of his nature soon pushed him on to make 'the first great sacrifice of his life,' by renouncing 'the career of literature for the more direct path of political action.' In 1829 he joined the Carbonari (q.v.), although he mistrusted their aims, their methods, and the character of their organisation. He was betrayed in July 1830 to the Sardinian police, and imprisoned in Savona. In his prison cell he matured those thoughts which became the ruling principles of his life and work, and shortly after his release, early in the following year, organised at Marseilles the Young Italy Association. The first and last duty of its members was to labour to create a free, independent, and united nation of Italians. The great mass of the people were to be educated to understand their rights, and taught to obtain them, if need were, through insurrection. But Italy must first be freed from the yoke of the foreigner. Nothing but a republic could serve her political needs in the future. Once Italy were regenerated, she 'was destined to arise the initiatrix of a new life, and of a new and powerful unity to all the nations of Europe'—the selfsame rôle that Heine and Young Germany assigned to regenerated Germany. The ultimate goal was the governance of the world by the moral law of progress, through the effective agencies of association, man with man and nation with nation. 'The labour to be undertaken was not merely political, but above all a moral work; not negative, but religious.' It was essentially the practice of a faith, the living of a creed, a religion. It was in this spirit that Mazzini laboured to his life's end—unwaveringly, disinterestedly, through the bitterest humiliations of exile, and at the cost of the greatest personal sacrifices.

Shortly after Charles Albert ascended the throne of Piedmont (April 1831) Mazzini addressed to him a manly appeal, urging him to put himself at the head of the struggle for Italian independence, and to grant needful concessions to his people's cry for liberty. His answer was a sentence of perpetual banishment, Metternich having forced the new king to take a commission in the dragonnades of reaction. Further, in August 1832 the French authorities expelled him from the country. But he outwitted them, and lay hidden at Marseilles. From this time he led for more than twenty years 'a life of voluntary imprisonment within the four walls of a little room.' But no confinement could quell his spirit or restrain his activity. Henceforward he was the most untiring political agitator in Europe, the man most dreaded by its absolute governments; with Lassalle he was one of the most conspicuously successful of the century. He wrote incessantly, in a strain of such fervid eloquence,

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and with such an intensity of conviction, that his words kindled in the hearts of those that read them the enthusiasm to do and dare all things. Though by nature frank, open, and bold, no man perhaps learned to understand better the tortuous arts of secret conspiracy. He was driven to adopt this underground method of warfare by the power and vigilance and unscrupulous character of the enemies he contended against, and the close and united front they presented to every revolutionary assault. In 1834 he organised an invasion of Savoy, which failed ignominiously, chiefly through the lukewarmness, if not treachery, of the soldier placed at its head. The next two years Mazzini spent in Switzerland, incessantly active, extending his organisation throughout Italy, instigating his countrymen to insurrection, and scattering broadcast through Europe the bursting seeds of republican revolt. In the year of the Savoy fiasco he drew up, at Bern, for Young Europe—i.e. Young Italy, Young Germany, and Young Poland united—the *Pact of Fraternity*, a code of abstract doctrines dictating to humanity a faith and rules of life. Being in the last days of 1836 banished from Switzerland, he found a refuge in London. Although for some years (1841–48) he struggled hard against poverty, he nevertheless contrived to help his poorer, ignorant countrymen, the organ-boys of London, by gathering them round him in night-classes and teaching them and civilising them. In 1844 he charged the English government with opening his letters, and communicating their contents to the rulers in Italy, and made good his accusation. This raised a great storm of indignation throughout the country, and drew from Carlyle a spirited testimonial to Mazzini in *The Times*. Sir James Graham, the Home Secretary, even felt constrained to apologise in the House of Commons for having publicly repeated the calumnies of his enemies.

On the outbreak of the Lombard revolt in 1848 Mazzini hastened to throw himself into the thick of the struggle. The king of Sardinia sought to win him over by the promise to make him first minister in the new Piedmontese-Lombard state, and to grant him as large a share as he might desire in the framing of a constitution for it. But Mazzini's aims were not of personal ambition, and he would be no party to the aggrandisement of the dynasty of Savoy at the expense, or to the detriment, of a united Italy. After Milan capitulated, he tried with Garibaldi to keep the war alive in the valleys of the Alps; but, when he saw that all was over in Lombardy, he made his way to Tuscany. Leghorn received him with wild enthusiasm on 8th February 1849, the day before the republic was proclaimed at Rome, and elected him her deputy to the republican assembly in the papal city. On 29th March Mazzini, Saffi, and Armellini were appointed a triumvirate with dictatorial powers; they chose as their motto 'God and the People.' But on 25th April the French arrived before the city to reinstate the pope, and after a tough struggle were admitted within the walls. The republic fell, and the triumvirs indignantly resigned on the last day of June. Mazzini made his way back to London. Not however to rest: he planned the attempted risings at Mantua (1852), Milan (1853), Genoa (1857), and Leghorn (1857). Meanwhile in London he had founded, along with Kossuth and Ledru-Rollin, the European Association, and with them issued in September 1855 its republican manifesto. The Society of the Friends of Italy was organised about this time in England. In 1859 Mazzini condemned the alliance Piedmont had made with Napoleon III.; and the cession of Savoy and Nice to France not only justified his prophetic warning, but filled him (and Garibaldi) with the patriot's sorrowful indignation. He supported Garibaldi in his expedition against Sicily and Naples with all his influence and all his resources; and when Piedmont stepped in to reap the fruits of the soldier's heroic exertions, and even scattered his followers and took him prisoner at Aspromonte (1862), Mazzini broke finally with the monarchical party. The king replied to his fulminant by again passing sentence of death upon him—the third time. But this did not deter him from stigmatising the Convention of September (see ITALY) as a base compromise. In 1866–67 Messina in protest elected him its deputy to the Italian parliament four times in succession. Two years later he was again expelled from Switzerland, and in the following year (1870) was arrested at sea, whilst on his way to Sicily, and carried prisoner to Gaeta. After being detained two months he was set at liberty. He settled at Lugano, but died at Pisa, 10th March 1872, and was buried in his native city, mourned by the entire nation he had done so much to create.

Although from one point of view a utopian idealist and political dreamer, the apostle of the new democratic evangel, and from another point of view a restless demagogue, a dark conspirator, and disturber of the peace of Europe, Mazzini must be acknowledged by both parties alike to have been a man of immense energy and resource, and of great organising power, who unquestionably had the full courage of his convictions, and was consistent and thoroughly sincere and disinterested in his aims. His temperament and the constitution of his mind made him feel impatience and scorn of the moderates, the calm, cautious watchers and waiters for opportunities. He was averse to nibbling advantage after advantage, and had no sympathy for the compromises and half-measures of statesmen and diplomatists. His was the spirit that burns the bridges behind it, stakes all on one critical throw, and puts forth all its energy to bring about a decisive and final result. Cavour was of an opposite temperament: he was essentially the cautious, calculating statesman. Hence the fundamental antagonism between the two men. Cavour was a man of aristocratic birth and training, and the levelling doctrines of the new republicanism were in the highest degree repugnant to him. No wonder then that he disliked Mazzini, the ardent apostle of equality, fraternity, and humanity, the uncompromising enthusiast of action. And no wonder too that Mazzini failed to sympathise with the methods of Cavour: he saw in them no ruling principle beyond advantaging the House of Savoy, no desire to labour for the people, no plan, no promise for their progress, and nothing like faith in their future. Nevertheless, on more than one critical occasion he abstained from embarrassing the Sardinian government, even when he did not approve of its proceedings. His own ability to govern is best evidenced in his successful organisation of the difficult forces of secret insurrection; his brief tenure of office at Rome was beset by so many untoward conditions as to effectually preclude him from showing his real mettle. Mazzini has been called the prophet of Italian unity, Garibaldi its knight-errant, and Cavour the riveter of the bolts that finally united the *disjecta membra* of the nation together. Perhaps it would be more correct to say that Mazzini prepared the soil, sowed the seed, and fostered the growing plants, that Garibaldi did the work of gathering in the ripe fruit, but it was Cavour who gained the final advantage of the harvest.

All Mazzini's writings are, like Heine's, desultory in character, some few literary and critical, but most of them political, germane to the questions of the hour. His longest productions are *On the Duties of Man*, a noble outline of ethical theory,

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and *Thoughts upon Democracy in Europe*, a discussion of the prominent schools of economics and socialism. Apart from his eloquence, the features of his writing that most forcibly arrest attention are his manly, outspoken tone, his candid fairness—except sometimes when he is speaking of the moderates—his sterling love of justice and of freedom, but above all things else his keen and accurate insight into the historical tendencies of modern Europe.

The best source for Mazzini's life and works is the collected edition of his *Scritti, Editi ed Inediti*, 16 vols., the first eight (1861–74) prepared for the press by Mazzini himself, the last eight (1877–89) by Aurelio Saffi, his brother triumvir at Rome. An English edition (6 vols. 1864–70; new ed. 1890–91) has been selected from the first eight vols. of the *Scritti*. See also *Memoir* by E. A. Vinturi (2d ed. 1877); Marriott, *Makers of Modern Italy* (1889); and Clarke, *Selected Essays of Mazzini* (1887).

Mead, a fermented liquor made from honey. The honey is mixed with water and fermented. Cottagers sometimes use the honey which remains in the combs after the usual processes of dropping and squeezing, for making mead, which is a thin and very brisk, but at the same time luscious beverage. Mead has been in use from very ancient times, and was known equally to the polished nations of southern Europe and the barbarous tribes of more northern regions. The Latin name is *Hydromel*.

Meade, GEORGE GORDON, an American general, was born 31st December 1815, at Cadiz, in Spain, where his father was a merchant and United States navy agent till 1816. He graduated at West Point in 1835, served for a time against the Seminoles and in the Mexican war, but was mostly employed on survey duty and in the construction of lighthouses until the civil war, becoming captain of engineers in 1856, and major in 1862. In 1861 he obtained a brigade of volunteers, and during the peninsular campaign received a severe gunshot wound. He distinguished himself at Antietam and at Fredericksburg, and was promoted major-general in November 1862. In June 1863 he was placed in command of the Army of the Potomac, superseding Hooker (q.v.) on the night of the 27th. A week later Gettysburg had been fought, and Lee's effort to carry the war into the country north of the Potomac had been defeated. Meade became brigadier-general in the regular army on 3d July, and major-general in 1864. After the war he commanded various military departments, until his death, which occurred at Philadelphia, 6th November 1872. There is an equestrian statue of him (1887) in Fairmount Park there.

Meadow Saffron. See COLCHICUM.

Meadows-Taylor. See TAYLOR.

Meadville, capital of Crawford county, Pennsylvania, on French Creek, 113 miles by rail N. of Pittsburg. It manufactures woollens, paper, glass, machinery, agricultural implements, &c., has oil-refineries and large railway-shops, and is the seat of Alleghany College (Methodist, founded 1815), and of a Unitarian theological school. Pop. (1890) 9502.

Meagher, THOMAS FRANCIS, Irish patriot, was born in Waterford, 3d August 1823, son of a wealthy merchant who represented Waterford for several years. He had his education at the Jesuit college of Clongowes Wood in Kildare, and at Stonyhurst, and early devoted himself to the patriotic cause as a prominent and fearless member of the Young Ireland party. In 1848 he was sentenced to death under the 'Treason-felony' Act, but was sent for life to Van Diemen's Land instead. He made his escape in 1852, studied law in the United States, but on the outbreak of the war volunteered into the national army. In 1861 he organised the 'Irish brigade' for the Federals, and distinguished himself by his courage in the seven days' battles around Richmond, at the second battle of Bull Run, Fredericksburg, and Antietam. After the war he became secretary of Montana territory, and while taking measures as temporary governor to keep the hostile Indians in check, fell from the deck of a steamboat into the Missouri, near Fort Benton, and was drowned, 1st July 1867.

Meal. See BREAD.

Meal-tub Plot, a conspiracy fabricated in 1679 by Thomas Dangerfield to gain credit as an informer equal to that of Titus Oates and Bedloe. The son of a Roundhead farmer, he was born about 1650 at Waltham in Essex, and he had first started with the baseless assertion that the Presbyterians were conspiring to destroy the government and set up a republic. When this was discovered to be a lie he was flung into Newgate, whereupon he rounded at once upon the Roman Catholics, declaring that the pretended Presbyterian plot was only a cover for their own design upon the king's life, and that the papers would be found concealed at the bottom of a meal-tub in the house of one Mrs Cellier, who, together with Lady Powis, was actually tried and acquitted for the plot. Dangerfield himself was whipped and pilloried in June 1685, and on his way back from Tyburn was killed by a blow in the eye from the cane of a barrister, Robert Frances, who was executed for the murder.

Meal-worm, the larva of a small black beetle, *Tenebrio molitor*, allied to the common Blaps (q.v.). Both adults and larvæ are too common about bakeries, granaries, and stores, for the eggs are laid in meal, flour, and similar food-stuffs, on which the emerging larvæ feed voraciously. The adult resembles Blaps, and is about half an inch long; the larva is decidedly longer, thin and round, yellowish in colour. An American species, *T. obscurus*, has also become common in Britain. The preventive is thorough cleanliness. The meal-worms are often used as food for cage-birds.

Mealy Bug (*Coccus adonidum* or *Dactylopius longispinus*; see COCCUS), an insect naturalised in our hothouses, and very commonly found on such plants as Stephanotis and Camellia, orchids and pine-apples. The young appear like small reddish-brown moving specks on the leaves and small branches, to which they afterwards affix themselves by the beak. As they grow older they become darker in colour, and are covered over with a white powdery-looking substance. After fertilisation, which usually takes place in spring, the female, remaining in the position described, lays her eggs between her body and the surface of the plant, after which her body shrivels up until it forms a covering for the mass of eggs, rendered more effectual by the large amount of cottony material formed over it. The young can be seen developing in scores in the midst of this material, from which they afterwards free themselves, and run about on the plant. The Mealy Bug is disliked by gardeners chiefly on account of the amount of dirt that collects round it on the leaves and branches, and the injury it does to the flowers and fruit. Lightly syringing the plants with soft soap and quassia solutions with a little paraffin oil in addition is generally sufficient to check the ravages of this little pest, especially if put on before the larvæ acquire their mealy coats. On valuable plants this may be painted with brushes. Tobacco smoke proves useful in the early stages.

Mean, in Mathematics, is a term interpolated between two terms of a series, and consequently intermediate in magnitude. The Geometrical Mean (q.v.) of two numbers is always less than

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their Arithmetical Mean (q.v.) and greater than their Harmonic Mean, and the geometric mean is itself a geometric mean between the two others.

Meanee. See MEEANEE.

Mearns. See KINCARDINESHIRE.

Measles (known also as RUBEOLA and MORBILLI) is one of the group of blood diseases termed *Exanthemata* (q.v.), although, from the eruption which appears on the surface of the body, it is sometimes classed with the skin diseases. It is communicable from person to person, not least so in the early stage when it is indistinguishable from an ordinary cold; and it seldom occurs more than once in the same individual. Its period of incubation—i.e. the time that elapses between exposure to the contagion and the first appearance of the febrile symptoms which precede the eruption—is usually about a fortnight; then come lassitude and shivering, which are soon followed by heat of skin, increased rapidity of the pulse, loss of appetite, and thirst. The respiratory mucous membrane is also affected, and the symptoms are very much the same as those of a severe cold in the head, accompanied by a dry cough, a slight sore throat, redness and watering of the eyes, and sometimes tightness of the chest.

The eruption which is characteristic of the disease usually appears upon the fourth day from the commencement of the febrile symptoms and the catarrh—seldom earlier, but occasionally some days later. It is a rash, consisting at first of red papules of various sizes, which, as they multiply, coalesce into crescentic patches. It is two or three days in coming out, beginning on the face and neck, and gradually travelling downwards. The rash fades in the same order as it appears; and, as it begins to decline three days after its appearance, its whole duration is about a week. The red colour gives way to a somewhat yellowish tint, and the cuticle crumbles away in a fine bran-like powder, the process being often attended with itching.

There are two important points in which it differs from Smallpox (q.v.), with which in its early stage it may be confounded; these are: (1) that the fever does not cease or even abate when the eruption appears, but sometimes increases in intensity; and (2) that the disease is not more severe or more dangerous because the eruption is plentiful or early. The character of the eruption, after the first day, will serve to remove all doubt regarding these two diseases; and the comparative prevalence of either disease in the neighbourhood will materially assist in forming the diagnosis. It is distinguished from Scarlet Fever (q.v.) or scarlatina (1) by the presence at the outset of catarrhal symptoms, which do not occur in the latter disease, at anyrate prior to the eruption; (2) by the absence of the characteristic throat-affection, which always accompanies well-marked cases of scarlet fever; (3) by the character of the rash, which in measles is said to present somewhat the tint of the raspberry, and in scarlet fever that of a boiled lobster; which in measles appears in crescentic patches, and in scarlet fever is universally diffused over the parts affected; which in measles usually appears on the fourth day, and in scarlet fever on the second day of the disease.

In ordinary uncomplicated measles, the prognosis is almost always favourable. The chief danger is from inflammation of some of the textures that compose the lungs; and in scrofulous children it often leaves chronic pulmonary mischief behind it. No age is exempt from the disease, but it is much more common in childhood than subsequently. The reason probably is that most persons have it in early life, and are thus protected from an attack at a later period.

In mild forms of the disease, nothing more is requisite than to keep the patient on a low diet, attend to the state of the bowels, and prevent exposure to cold, which is best accomplished by keeping him in bed with the ordinary warmth to which he is accustomed in health. While the eyes are red and irritable, it is desirable that he should be shaded from the light. If the chest-symptoms become urgent, they must be treated according to their nature. Bronchitis (q.v.), sometimes extending into Pneumonia (q.v.), is most to be feared. If the eruption disappear prematurely, it may sometimes be brought back by placing the patient in a warm bath. In such cases stimulants are often required, but must, of course, only be given by the advice of the physician. The patient must be carefully protected from exposure to cold for a week or two after the disease has apparently disappeared, as the lungs and mucous coat of the bowels are for some time very susceptible to inflammatory attacks. In some cases considerable debility remains for a long time after the attack; and both the eyes and ears are very liable to injury from inflammations accompanying or succeeding it.

German Measles is a name somewhat loosely used of a disease, or possibly several diseases, resembling measles, but for the most part less prolonged and severe. The cases grouped under this title, however, require further elucidation, as descriptions given by different authors differ very widely from each other.

Measures. See WEIGHTS AND MEASURES.

Meat. For the dietetic value of meat, and the amount of meat imports, see FOOD. For extract of meat, see EXTRACTS, and see also PRESERVED PROVISIONS. The sale of unsound meat is prohibited under heavy penalties by the Public Health Act of 1875, which regulates the powers of medical officers and inspectors of nuisances to examine game, flesh, milk, &c., and to have such meat or other food, if unfit for human food, destroyed by order of a justice of peace.

Meath, a maritime county of Leinster, Ireland, bounded on the east by the Irish Sea, for 10 miles, and the counties of Dublin and Louth; area, 906 sq. m., or 579,861 acres, of which 34,300 are waste, bog, &c. Maximum length, north to south, 40 miles; maximum breadth, east to west, 47 miles. Pop. (1841) 183,116; (1861) 110,373; (1881) 87,469, of whom 80,686 were Roman Catholics and 5198 Protestant Episcopalians. The soil is a rich loam, and extremely fertile; but close upon 67 per cent. of it is devoted to pasture, the extent under crops (chiefly oats and potatoes) being about one-fourth of the total. The surface is for the most part undulating, being the eastern part of the great limestone plain of Ireland. The chief rivers are the Boyne and Blackwater; the Royal Canal passes along the southern border of the county. The principal towns are Trim, Navan, and Kells. A little linen and coarse woollen is manufactured. Anciently, Meath, which included West Meath, Longford, and parts of the adjoining counties, formed one of the kingdoms into which Ireland was divided, the royal seat being Tara (q.v.), where ancient earthworks still remain. After the English invasion it was occupied by Strongbow, and was erected into a county palatine by Henry II., who conferred it on Hugh de Lacy. In the end of the reign of Henry VIII. it was separated into East and West Meath. Celtic remains abound along the Boyne and Blackwater. John's Castle at Trim is one of the most extensive monuments of English rule in Ireland. There are a round tower and sculptured crosses at Kells, and a round tower at Donoughmore. Monastic ruins survive at Bective, Clonard, and

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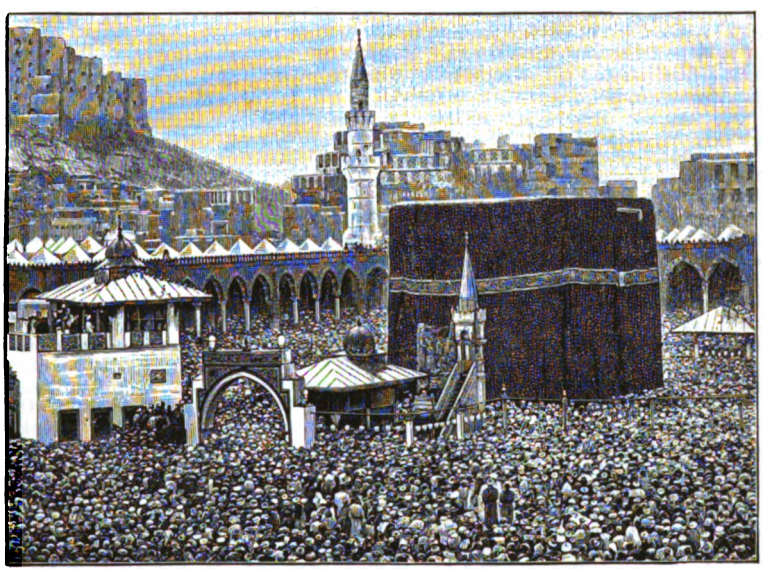
Duleek. Meath returns two members to parliament.

Meaux, a town in the French department of Seine-et-Marne, on a height above the river Marne, 28 miles NE. of Paris. It is a bishop's see, and in its noble Gothic cathedral (12–16th century, but still unfinished) is the grave of Bossuet (q.v.), who was bishop for twenty-three years. There is a large trade with Paris in corn, flour, cream-cheeses, &c. Meaux was besieged by the serfs of La Jacquerie (1358), and captured from the League (1594). Pop. (1872) 11,202; (1886) 12,201. See Carro, *Histoire de Meaux* (1865).

Mecca (also anciently called *Becca*), the Makoraba of Ptolemy, is one of the oldest cities of Arabia and the capital of the Hedjâz, and as a holy city and focus of pilgrimage it may be called the metropolis of Islam. It is situated in 21° 30′ N. lat. and 40° 8′ E. long., 245 miles S. of Medina and 65 E. of Jiddah, its port on the Red Sea, in a narrow barren valley, surrounded by bare hills penetrated by two passes, and so secluded from observation that it is not visible until closely approached. The barrenness of the soil compelled the inhabitants to go outside for provisions, and the command of the principal caravan roads, both from north to south and from the coast to the highlands, gave the Meccans unusual facilities for commerce, and thus from a very early period the city was a notable trading centre. But the chief cause of its prosperity was its reputation as a holy place, possessing sacred objects, which well repaid a pilgrimage; though whether the original attraction was the Black Stone or fetish of the Káaba, or the medicinal spring Zemzem, is a matter of dispute. The city itself, which is mainly modern owing to the frequent devastations caused by the winter torrents from the hills around, is about 1500 paces long and 650 broad, and is divided into more than twenty chief quarters. Along and beyond it runs the celebrated sacred course, a broad road extending from Safa to Marwa, which is run over by all pilgrims, and also forms a frequented bazaar. The streets are broad and airy, but unpaved and filthy, and the houses, climbing the hills on either side, are of stone, and well built, sometimes three or four stories high, with flat roofs and overhanging lattice-windows. The interiors are well kept, since the greater part of Mecca is devoted to the annual pilgrimage which is the main support of a multitude of lodging-house keepers, guides, and the other attendants of a fashionable sanctuary. There are charitable lodgings for the poorer pilgrims, and also public baths, and a hospital. Drainage there is none, though there is plenty of water. Provisions, meat, fruit, &c. are readily procured from neighbouring parts of Arabia. The population, which is notorious for its vice and corruption of every sort, is probably under 60,000; but these are annually reinforced by at least an equal number of pilgrims. The latter, however, are not numerous enough to satisfy the natives, who fleece them without remorse, and are too idle to supplement their extortions by any industry more vigorous than the manufacture of sacred relics. The temple of Mecca, or the Great Mosque, stands in the broadest part of the valley, and consists of a large quadrangle, capable of holding 35,000 persons, surrounded by arcades or cloisters, with pillars of marble and granite, &c., and entered by nineteen gates surmounted by seven minarets. In the centre is the Káaba (i.e. cube), which was the temple of Mecca ages before the time of Mohammed, and then attracted pagan pilgrims just as now it draws thousands of Moslems. It has been twice rebuilt in historical times, but the old form has been preserved. It is not quite square, nor properly orientated; and it measures about 18 paces by 14, and 35 or 40 feet high. When Mohammed converted the heathen shrine into a Mohammedan focus, the original notion of an idol temple with a miraculous fetish was abandoned, and the legend was invented that the Káaba was built by Abraham on the occasion of the outcasting of Ishmael. The celebrated fetish, or Black Stone, is apparently a meteorite, about a span long, built into the south-east corner at the proper height for kissing. There is also a 'Southern Stone,' of only inferior sanctity. The pilgrim circumambulates the Káaba seven times, kisses the Black and touches the Southern Stone, and also goes round the Hijr or semicircular enclosure containing the so-called graves of Hagar and Ishmael. The Káaba has always been richly decorated, and has long been annually re-covered (leaving only apertures for the two stones) with handsome brocaded hangings presented by the Sultan of Turkey, and brought with much state, along with the traditional Mahmal or Holy Carpet, by the Egyptian Hajj (q.v.), or caravan of pilgrims. The other chief decorations are the silver-gilt door, seldom opened, the marble inlay and silver-gilt plating and silk hangings of the interior, which contains little of interest. Hard by, and also within the court, is the celebrated well of Zemzem, a deep shaft covered by a cupola; the tepid water of which may once have been mineral, and is still regarded as miraculous, although the largest item in its present



Pilgrims round the Káaba. (From a private Photograph.)

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analysis consists of sewage matter. This important attraction for pilgrims was long lost, but was rediscovered by Mohammed's grandfather. Another object of veneration is 'Abraham's Stand,' the stone of which, with the imprint of his foot, is concealed from view. Outside the Káaba are no sacred or antiquarian buildings of importance, though several houses are pointed out by the guides as dwellings of persons famous in the early days of Islam. In the time before Mohammed Mecca was under the control of the Koseites, and then of the Koreish, from whom the Prophet reconquered it in 627, five years after his Flight or Hegira (q.v.) therefrom. It long remained under the rule of the califs, who spent large sums in its adornment. In 930 it was sacked by the Karmathians, who carried off the Black Stone, and kept it for twenty-two years. Mecca afterwards fell under the influence of whatever dynasty—Fatimite, Ayyûbite, or Mameluke—happened to rule in Egypt; and thus finally it came into the possession of the Ottoman sultans, whose power, however, is nominal, whilst the real governor is the sherif, or reputed head of the descendents of the Prophet, who has long held the chief authority in the Hedjâz, and has the support of a large following of retainers. Burckhardt, the first Christian to visit Mecca, has, owing to native fanaticism, found but few successors.

See Snouck Hurgronje, *Mekka, mit Bilder-Atlas* (1888); W. Robertson Smith in *Ency. Brit.* (1883); Wüstenfeld, *Chroniken d. Stadt Mekka* (1857-59); Sir Richard Burton's *Pilgrimage* (1855; new ed. 1880); Burckhardt's *Travels in Arabia* (1829).

Mechanics is the science which treats of the nature of forces and of their action on bodies, either directly or by the agency of machinery. See FORCE, ENERGY, DYNAMICS. The action of forces on bodies may be in the form of pressure or of impulse, and may or may not produce motion. When the forces are so balanced as to preserve the body affected by them in a state of equilibrium, their actions are investigated in that branch of mechanics called Statics; when motion is produced, they are considered under the head of Kinetics (q.v.). See also the articles on Kinematics, Hydrostatics, Hydrodynamics, and Pneumatics.

Machines are instruments interposed between the moving power and the resistance, with a view of changing the direction of the force, or otherwise modifying it. Machines are of various degrees of complexity; but the simple parts, or elements of which they are all composed, are reducible to a very few. These elementary machines are called the Mechanical Powers, and are usually reckoned as six in number, three being primary—viz. the *lever*, *inclined plane*, and *pulley*; and three secondary, or derived from the others—viz. the *wheel-and-axle* (derived from the lever), the *wedge*, and the *screw* (both derived from the inclined plane). What is special to each machine will be found under its name.

Mechanics' Institutes are voluntary unchartered associations of mechanics or workingmen for the purpose of providing themselves, at small individual cost, with instruction in elementary and technical branches of knowledge, by means of a library, reading-rooms, classes, and lectures. The management is wholly or in great part in the hands of a committee or committees elected by the members of the association. The earliest germ of the Mechanics' Institute was a class for journeyman mechanics formed by Dr Birkbeck (q.v.) at Glasgow in 1800; but the first Mechanics' Institute, properly so called, was organised by the same philanthropist in London in 1824. The original aim of the first institutes was to teach mechanics the correct knowledge of the principles of their respective trades. Subsequently the basis was enlarged, and the teaching of the elements and principles of a general education aimed at. Out of these organisations have grown, through the introduction of means of recreation and temperate enjoyment, the Working-men's Social Clubs and Educational Institutes.

Mechitar'ists, a congregation of Armenian Christians who entered into communion with the Church of Rome, when Clement XI. was pope, in 1712. They derive their name from Mechitar (i.e. the Comforter) da Petro (1676–1749), who in 1701 founded at Constantinople a religious society for raising the intellectual and spiritual condition of his countrymen, and for the purpose of diffusing a knowledge of the old Armenian language and literature. Two years later, however, the sectarian jealousy of the Armenian patriarch in Constantinople led to their removal to the Morea, and thence, on the conquest of that portion of Greece by the Turks in 1715, to Venice, which in 1717 granted them the island of San Lazzaro. Their most useful occupation is printing the classic writings of Armenian literature, as well as valuable translations of works by Ephraem Syrus, Philo, Eusebius, and other writers, the originals being lost. At San Lazzaro they possess a large and valuable library of oriental works, and at Vienna (since 1810) an academy, with a printing-office, &c., to which non-Armenians are admitted. See Langlois, *Le Convent Arménien de Saint-Lazare de Venise* (1863).

Mechlin. See MALINES.

Mecklenburg, the common name of two grand-duchies of Germany, distinguished respectively as MECKLENBURG-SCHWERIN and MECKLENBURG-STRELITZ, and situated between the Baltic on the N. and Brandenburg on the S., whilst Pomerania lies on the E. and Sleswick-Holstein and Lübeck on the W. The former is a compact territory, abutting on the Baltic for 65 miles, its area being 5197 sq. m. (much less than Yorkshire). Mecklenburg-Strelitz (1144 sq. m.) consists of two detached portions, the grand-duchy of Strelitz, lying SE. of Mecklenburg-Schwerin, and the principality of Ratzeburg, wedged in between Schwerin and Lübeck. The region indicated forms part of the great North German plain, but is crossed by a low ridge from the south-east to the north-west, the water-parting between numerous small rivers that drain to the Elbe and to the Baltic. Along the line of this ridge there are more than 500 lakes, some of fairly large size. Canals too connect many of the lakes and navigable rivers, especially towards the Elbe. Except for sandy tracts and turfy moors the soil is fertile; agriculture is the chief occupation. The merino sheep are the finest in Germany. There is some iron-founding, making of agricultural implements and tiles, manufacturing of beet-root sugar, distilling, brewing, and tanning. Amber is found on the coast and some of the lakes, and turf is dug. The chief ports are Wismar and Rostock (Warnemünde). The population of Schwerin was 575,152 in 1885, 1903 less than in 1880; of Strelitz (1885) 98,371, against 100,269 in 1880. The diminution is chiefly due to emigration. The rural population are almost entirely Germanised Slavs, the nobility and the inhabitants of the towns for the most part of Lower Saxon stock. The popular dialect is Platt-Deutsch or Low German; the religious confession Lutheran. Rostock (q.v.), the largest town in Schwerin, has a university. The capital of each grand-duchy is a town of the same name as itself. Society in Mecklenburg is still organised on a feudal basis, and in the early part of the 19th century was not so advanced as England in the 13th century; serfdom was abolished only in 1824. At the head of

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each grand-duchy stands a grand-duke; but both grand-duchies are represented in one and the same national assembly, which meets every autumn at Sternberg and Malchin alternately. This body embraces all landowners (about 680), who also represent the peasantry and agricultural labourers, and representatives of forty-eight towns. The principality of Ratzeburg, and the towns of Wismar and Neustrelitz, have each an independent administration. A permanent college of nine members, representing the assembly, sits all the year round at Rostock. The executive is in the hands of four ministers (external and home affairs, justice, and finances) in Schwerin, and one minister in Strelitz. No financial statements are ever published in either grand-duchy. In Schwerin, however, there are three separate budgets, one controlled by the grand-duke, one, very small, controlled by the estates, and one by both parties in common. For the representation in the imperial assemblies, see GERMANY, Vol. V. p. 179. Although the evils under which the country workmen suffered fifty years ago, of which Fitz Reuter, the great Platt-Deutsch writer, gives a painful description in his poem *Kein Hüsung*, have been greatly mitigated, still the fact that large numbers emigrate because they cannot find houses to live in, and the relatively high proportion of illegitimate children, owing to the restraints imposed upon marriage by the landowners, prove that they have not been altogether abolished yet. Fritz Reuter's great novel *Stromtid* (Eng. trans. *My Old Farming Days*, 1878–80) and other works give admirable pictures of the semi-patriarchal, semi-feudal life of his native country.

In the 6th century Slavic races settled in the districts now called Mecklenburg, which had just been left vacant by the Vandals. From the 9th to the 12th century the German emperors and the Saxon dukes attempted at different times to convert the inhabitants to Christianity. The country was only definitely incorporated in the German empire in 1170. It was divided over and over again, from 1229 onwards for more than five hundred years, amongst different branches of the descendants of the original Slavic princes. Of these dukes (dukes after 1348) the only one deserving special mention is Albert III., who, called to ascend the throne of Sweden in 1363, was kept a prisoner for many years by Margaret, queen of Denmark, Norway, and Sweden. The Thirty Years' War ruined the independent peasant proprietors. Wallenstein casting covetous eyes upon the duchies, they were sold (1628) to him by the emperor, but were restored to their rightful rulers in 1635. The two lines of Mecklenburg-Schwerin and Mecklenburg-Strelitz date only from 1701; in 1755 they agreed that the line which survived longest should inherit the territories of the other, and when both became extinct Prussia should be heir. The title of grand-duke was assumed by both reigning dukes in 1815. The year 1848 brought disturbances and tumults in Mecklenburg; a representative assembly was called together, and other reforms initiated; but the reaction of 1850 and following years restored things to their original condition. The two states were again agitated by reform questions in 1871–78; but nothing came of the agitation.

See books by Geinitz on the geology, soil, lakes, &c. of Mecklenburg (1884–86); Boll, *Geschichte Mecklenburgs* (1855–56); and various works on the history and social condition of the people by Wiggers (1840 to 1865).

Meconium (Gr. *mēcōn*, 'a poppy'), the inspissated juice of the poppy; and *Meconic Acid* is an acid present in opium to the extent of about 4 per cent. in combination with the alkaloids (see OPIUM). Meconium is also the name given to the matter first discharged from the bowels of a new-born infant.

Medal (the same word as *metal*, through a Low Latin *medalla*), a piece of metal in the form of a coin, not issued or circulated as money, but struck to preserve the portrait of some eminent person or the memory of some illustrious action or event. Large medals are termed medallions; and works rectangular in form are known as plaques or plaquettes according to their size. The study of medals, which forms a branch of the science of numismatics, is interesting in a historical and antiquarian point of view, and important as illustrating the contemporary state of art. Like coins, medals are made in gold, silver, and copper, and some also consist of lead and alloys of other base metals. As they are generally produced in very limited numbers only as compared with coins, other methods of preparing them than by striking are available; and while all classical medals, and the bulk of those of modern times, are made in the same way as contemporary coinage, many of the most important and valuable of the medieval medals were cast by the *cire perdue* process. Important medals have also been made by *striking-up* or *répoussé* work, and highly esteemed works are also made simply by engraving. The earliest medals are medallions of ancient Rome, existing examples of which are principally in bronze, though some are in silver and in gold. They vary in size, being mostly about 1½ inch in diameter, but in weight they are so diverse as to exclude the notion that they were ever circulated as money. Medallions, prior to the time of Hadrian, are rare and of great value, one of the most beautiful and most famous being a gold medallion of Cæsar Augustus; from Hadrian to the close of the empire they are comparatively numerous. In some of them a ring or rim of lighter-coloured metal (brass or orichalchum) surrounds the centre of bronze, and the inscription extends over both metals.

From the fall of the Roman empire till the end of the 14th century there is a blank in the production of medals. The revival of the medallic art was one of the first fruits of the Renaissance movement, and practically its earliest, as for all times its greatest exponent was Vittore Pisano (*c.* 1380–1456), the painter of Verona. His medallions, generally marked *Opus Pisani Pictoris*, and those of his numerous followers, including Matteo de Pasti, Guacialotti, Sperandio, Sangallo, and many others, are distinguished by their vividness of sculpturesque portraiture, and their singular breadth and simplicity of treatment. Figures 1 and 2 show to a scale of one-half the original size the obverse and reverse of one of the most famous medals of Pisano. It celebrates the visit of the Eastern emperor, John VIII. Palæologus, to the Council of Florence in 1439; the legend on the obverse being in Greek, and the reverse inscription, *Opus, Pisani, Pictoris*, being also repeated in Greek. Generally speaking, it may be said that all medieval medals, previous to the 16th century, were made by casting in the *cire perdue* process; and it was not till the beginning of the 16th century that medals struck from engraved dies, like coins, were issued, the first so produced being the medal of Pope Julius II., by Francia, struck about 1506. The larger medals of the 16th century, however, continued to be cast. The most elaborate and beautiful of the struck medals of the 16th century were the work of Benvenuto Cellini; and it may be remarked that with the introduction of dies for medal-striking the work passed into the hands of gem-engravers and jewellers, whose methods and excellences lie in quite a different direction from those of the 15th-century artist-medallists. Next to Italy, Germany was the country in which the medallic art flourished in medieval times, Nuremberg having been a centre from which many important works were issued.

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Of the German school, Albert Dürer was the most famous of the early exponents. In Holland a remarkable series of *jettons* or medalets were issued in the 16th and early part of the 17th centuries, which give a record of the important events of which that country was then the theatre. In the 16th century the most important medals of French origin were produced by Jacques Primavera and Germain Pilon, and in the succeeding century Briot and Dupré were the great medallic portrayers of contemporary personages and events. English medals begin only with Henry VIII., and from Edward VI. onwards there is an unbroken succession of coronation medals. The earlier medals are cast in a very inferior manner, and are certainly not the work of native artists; indeed, it is not till the period of Elizabeth that we find native talent developed in the direction of medal-working, and even thereafter it was largely to Dutch, French, and Italian artists that the principal English medals were due. The Scotch coronation medal of Charles I. is the first medal struck in Britain with a legend on the edge. The medal is the work of Briot, and around the edge it reads, *Ex Auro ut in Scotia reperitur*. The medals of the Commonwealth and Charles II. are principally by Rawlins and the brothers Simon, and under Charles II. the three brothers Rottier did important medallic work in England. In the 18th century J. A. Dassier, a native of Geneva, executed a series of medals of English monarchs from the time of William I., and other important works were the production of Croker, Richard Yeo, and Thomas Pingo. Of 19th-century English medals the best are due to the Italian Pistrucci and to Thomas and William Wyon and their successors.

Official medals at the present day are principally issued for naval or military services. The first war medal given in England was the 'Ark in flood medal' bestowed by Queen Elizabeth in 1588 on naval heroes. The first English military medal was granted by Charles I. in 1643, and in 1650 an oval medal was executed by order of parliament for distribution amongst Cromwell's officers and soldiers engaged in the battle of Dunbar. Medals have been distributed to the troops in every victorious engagement and campaign since 1793 till the present time, but previous to the reign of Queen Victoria the Waterloo medal was the only one of this series struck. It was issued by order of the Prince Regent in 1816, and conferred on every officer and soldier present at the battle. The medal is of silver, with the head of the Prince Regent on the obverse, and on the reverse a figure of Victory seated on a pedestal, inscribed 'Waterloo,' with, beneath, the date June 18, 1815, and above, 'Wellington.' The Peninsular medal, for military services between 1793 and 1814, was issued only by the Queen in 1847, and conferred upon every surviving officer and private present at any battle or siege during these years. It carries no fewer than twenty-eight clasps for as many separate engagements, the first of which is Egypt, 1801. Long-service and good-conduct medals of silver were instituted in 1830 and 1831, and rules then formed for their distribution among meritorious soldiers, sailors, and marines. On the edge of each of these medals is engraved the name, rank, and regiment or ship of its recipient. The Victoria Cross (q.v.) was instituted in 1856. Similar medals for military and naval services are issued by foreign powers.

Fig. 1.

Fig. 2.

See A. Heiss, *Les Médailleurs de la Renaissance* (vol. viii. 1890); Grueber's *Guide to the English Medals in King's Library, British Museum* (1881); Cochran-Patrick's Catalogue of the *Medals of Scotland* (1884); Lonbat's *Medallic History of the United States* (2 vols. 1878); D. Hastings Irwin's *British War Medals and Decorations* (1890); T. Carter's *British War Medals* (new ed. 1890); and a two-page illustration of medals of the preceding fifty years in the *Graphic* for 14th June 1890.

Mede'a, in Greek legend, a famous sorceress, the daughter of Æëtes, king of Colchis, and of the Oceanid Idyia, or of Hecate. When Jason, the leader of the Argonauts, came to Colchis in search of the Golden Fleece, she fell in love with the young hero, helped him to obtain the Fleece, and fled with him. She prevented her father from pursuing by killing her brother Absyrtus and strewing the sea with his limbs. She avenged her husband upon the aged Pelias by persuading his daughters to cut him in pieces and boil him in order to make him young again. Being deserted by Jason for Glauce or Creusa, daughter of Creon, king of Corinth, she revenged her wrongs by sending to her rival a poisoned robe or diadem which destroyed both her and her father. Medea then slew the children she had borne to Jason, and fled to Athens in a chariot drawn by dragons, which she obtained from Helios. There she was received by Ægeus, to whom she bore Medos; but, afterwards being compelled to flee from Athens, she took Medos to Aria, the inhabitants of which were thenceforth called Medes. She finally became immortal, and the spouse of Achilles in the Elysian Fields. The story of Medea was a favourite theme of the tragedians, but only the masterpiece of Euripides has come down to us. It was treated by Corneille and Grillparzer, and gave Cherubini the theme for an opera.

Medellin, (1) a town (pop. 1250) of Spain, on the Guadiana, 66 miles by rail E. of Badajoz. It is worth mention as the birthplace of Cortes.—(2) The second city of Colombia, capital of the department of Antioquia, lies in a lovely mountain-valley, 4850 feet above the sea, and 150 miles NW. of Bogotá. It is a handsome town, and possesses a cathedral, college, seminary, technical school, four printing establishments, and manufactures of pottery, porcelain ware, and jewellery. It has a considerable trade, exporting gold and silver. Pop. 40,000.

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Media, in ancient times, the name of the north-western part of Iran or Persia, was bounded by the Caspian Sea and Parthia on the E., and by Assyria and Armenia on the W. It corresponded approximately to the modern Persian provinces of Azerbijan, Ghilan, and Irak-Ajemi, and the eastern part of Kurdistan. The Medes were an Aryan people like the Persians; their state religion was Zoroastrianism, and the Magi (q.v.) its priests. They were at first a bold and warlike race, very skilful with the bow, and noted horsemen. The Median tribes who seem to have been in part subject to the king of Assyria, began towards 700 B.C. to be cemented together under a chief named Deioces (Dajaukku), who chose as his capital Ecbatana (q.v.), identified with the modern Hamadan. Their power grew stronger under his son Phraortes, who subdued the Persians, but perished in war with the Assyrians. Cyaxares, the son of Phraortes, renewed the war against Assyria, but it was interrupted by an invasion of Media by the Scythians. Having treacherously murdered their chiefs, he expelled their warriors. Then, in alliance with Nabopolassar, king of Babylon, he overthrew the Assyrian empire by capturing Nineveh about 607 B.C. Having annexed the northern provinces of the Assyrian empire, he began a war against Lydia; but the eclipse of 28th May 585, the same which had been foretold by Thales, terrified both parties into peace. Cyaxares was succeeded by his son Astyages. Against him the Persians, under their prince Cyrus, revolted about 550 B.C., and, being joined by a portion of the Median army under a chief named Harpagus, they took Ecbatana and deposed the Median king. From this time the two nations are spoken of as one people. Ecbatana became the summer residence of the Persian kings. After the death of Alexander the Great (324 B.C.), the north-western portion (Atropatene) of Media became a separate kingdom, which existed till the time of Augustus. The other portion, under the name of Great Media, formed a part of the Syrian monarchy. In 147 B.C. Mithridates I. took Great Media from the king of Syria, and annexed it to the Parthian empire. About 36 B.C. it had a king of its own, named Artavasdes, against whom and his ally, Phraates IV. of Parthia, Mark Antony engaged in a disastrous campaign. Under the Sassanian dynasty the whole of Media was united to Persia (q.v.).

See G. Rawlinson, *Five Great Monarchies of the Ancient Eastern World* (3 vols. 1879); Duncker, *History of Antiquity* (6 vols.; Eng. trans. 1877–83); Lenormant, *Sur la Monarchie des Mèdes* (1871); Oppert, *La Peuple et la Langue des Mèdes* (1879); A. von Gutschmid, *Neue Beiträge zur Geschichte des alten Orients* (1876); and the popular *Media, Babylon, and Persia*, by Miss Ragozin (1889; 'Stories of the Nation' series).

Mediatisation. See GERMANY, Vol. V. p. 177.

Medical Jurisprudence, also called Forensic Medicine, is the branch of medicine which brings medical science to bear on legal questions, in determining criminal and civil responsibility. It has regard mainly either to civil rights or to injuries to the person. Among subjects in its province are those connected with birth, pregnancy, murder, natural death, rape, insanity, monstrosity, accidental or intentional injuries, the action of drugs, &c., all of which are dealt with in their several places. As specially belonging to this subject may be noted the articles on BLOOD-STAINS and POISONING. Good general handbooks are Dr Taylor's *Manual* and *Principles and Practice*, and Dr C. M. Tidy's *Legal Medicine* (2 vols. 1882–83).

Medical Staff Corps. See ARMY, I. 438.

Medici, a distinguished Florentine family which attained to sovereign power in the 15th century, owed its earliest distinction to the success with which its members pursued various branches of commerce, and the liberality which they showed in devoting their wealth to the public good. Their well-known arms, representing six balls (from whence their war-cry of 'Palle'), were popularly but without reason believed to represent pills, as their name to show that they had been originally apothecaries. In 1465 Louis XI. of France honoured the Medici by conferring on them the right to wear the French fleur-de-lis on one of the balls. From the beginning of the 13th century the Medici took part in the government of their native republic, and from the period (1378) when Salvestro de' Medici was elected gonfaloniere the family rose rapidly in greatness. It was, however, Giovanni (born 1360) who amassed the immense fortune, and by his generosity and affability gained the position of influence hitherto unparalleled in the republic, to which his sons Cosimo and Lorenzo succeeded. With Cosimo (1389–1464), surnamed Il Vecchio ('the Ancient') and 'Pater Patriæ,' began the glorious epoch of the family; while from his brother Lorenzo was descended the collateral branch of the Medici which in the 16th century obtained absolute rule over Tuscany.

Cosimo's life, except during the brief period when the Albizzi and other rival families succeeded in successfully opposing the Medici influence in the government and exiling him from Florence, was one uninterrupted course of prosperity. He was successful in his political alliances, and procured for Florence security abroad and peace from civil dissensions within her walls. He employed his great wealth in encouraging art and literature. He made Florence the most brilliant centre of the revival of classic learning which distinguishes the 15th century, he enriched her with splendid buildings, and gave unrivalled treasures to the great libraries which he founded. Although his all-powerful influence was not explicitly recognised in the state, and the form of government remained republican, Cosimo in reality was entirely master of the town, and filled the public offices with his partisans. He was succeeded by his son Pietro I., surnamed Il Gottoso ('Gouty'), who, feeble in health and in character, was assisted in the government by the precocious talents of his son Lorenzo (1448–92), afterwards famous in history as Lorenzo il Magnifico.

On his father's death (1469) Lorenzo and his brother Giuliano were recognised as 'principi dello stato.' The growing power of the Medici had roused much envy amongst other great Florentine families; and in 1478 these malcontents, headed by the Pazzi and in league with the pope, Sixtus IV. (Della Rovere), who saw in the Medici a powerful obstacle to his schemes of temporal aggrandisement, formed a plot to overthrow their power, known as the conspiracy of the Pazzi. Only Giuliano was victim of the assassins who were to have killed both brothers during service in the cathedral, and the popularity of Lorenzo was increased by the courage and judgment shown by him in this crisis. Lorenzo was a worthy descendant of his famous grandfather, just in his government, magnanimous to his enemies, and not only a munificent patron of art and literature, but himself a man of wide culture and a distinguished lyric poet. To enlarge on the institutions, universities, and schools founded by him, and on the famous names of painters, sculptors, architects, philosophers, and poets who surrounded him would be to write the history of the Renaissance. He was one of the most zealous promoters of the art of printing, and established under Cennini a printing-press in Florence. Although he used his power in the state well, yet he sapped the existing forms

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of government; and, in seeking only the advancement of his family to more absolute power, he left Florence at his death weakened and ready to be the prey of her enemies during the troublous times which began with the 16th century.

Lorenzo left three sons, Pietro, Giuliano, and Giovanni. His eldest son, Pietro II. (born 1471), possessed neither capacity nor prudence, and showed himself treacherous alike to friend and foe. He allied himself with the king of Naples against Lodovico Sforza of Milan, and the latter in 1492 called to his aid Charles VIII. of France and his army (see ITALY). Pietro, terrified at the advance of the powerful invader, hastened to meet the French troops on their entrance into the Florentine dominions, and surrendered to them Pisa and Leghorn. The magistrates and people, incensed at his cowardice and treachery, drove him from Florence and declared the Medici traitors and rebels, and deposed them from participation in the government. Pietro was drowned (1503) in the Garigliano, near Gaeta, having joined the French army in their attempted conquest of the kingdom of Naples. All efforts of the Medici to regain their power in Florence were vain until in 1512 the pope, Julius II., consented to send the Spanish army to invade Tuscany. Prato, near Florence, was taken and sacked, and the Florentines, helpless and terrified, drove out their gonfaloniere, Piero Soderini, and recalled the Medici, headed by Giuliano II. (born 1478). In 1513 the elevation of Giovanni de' Medici to the papal chair under the name of Leo X. (q.v.) completed the restoration of the family to all their former splendour and reduced Florence to a papal dependency. Giuliano II. at the pope's desire surrendered the government to Lorenzo II., son of his elder brother Pietro II. Giuliano, created Duke of Nemours on his marriage with a relative of Francis I. of France, died in 1516. The young Lorenzo II., born 1492, and the last legitimate male descendant of Cosimo 'Pater Patriæ,' on whom the pope had also conferred the duchy of Urbino, was feeble, arrogant, and licentious. He died in 1519 leaving only one legitimate child, a daughter, Catharine (q.v.), afterwards wife of Henry II. of France, who played a conspicuous rôle as regent during her son's minority. An illegitimate son, Alexander, born 1510, was afterwards duke.

The power now passed into the hands of the Cardinal Giulio de' Medici, a natural son of the elder Giuliano, assassinated in the conspiracy of the Pazzi; and Giulio was created pope in 1523 under the name of Clement VII. During the invasion of Italy by the Emperor Charles V. in 1527, and the consequent weakening of the papal power, Florence rebelled against the regents imposed on her by the pope, and expelled them along with the young Prince Alexander. The pope and emperor, however, soon made peace, and their united forces were directed against Florence, which, during the famous siege lasting ten months, made her last desperate and unsuccessful stand for liberty. After the surrender of the town, August 1530, Alexander de' Medici was proclaimed hereditary Duke of Florence. His reign was one of unparalleled license and tyranny. He was assassinated in 1537 by his cousin Lorenzius, a descendant of the collateral branch which had its origin in Lorenzo, brother of Cosimo 'Pater Patriæ.' To this younger branch belonged also the next ruler of Florence, Cosimo I. (born 1519). He was son of the famous captain of free-lances, Giovanni delle Bande Nere ('of the Black Bands'). Cosimo, sometimes called the Great, possessed the astuteness of character, the love of art and literature, but not the frank and generous spirit of his greater predecessors. He was cruel and relentless in his enmities, but a just ruler. He extended his territories, and in 1570 was created Grand-duke of Tuscany, and crowned by Pope Pius V. He died in 1574, and was succeeded by his son Francesco I. (born 1541). This duke possessed few of his father's abilities and many of his faults. He became a tool in the hands of his mistress, the unscrupulous Bianca Cappello, whom he married in 1578. The almost simultaneous death of Francesco and Bianca (October 1587) raised suspicions that they had been poisoned by the duke's brother and heir, the Cardinal Ferdinando. Maria, daughter of Francesco I., became the second wife of Henry IV. of France. Ferdinando I. and his son Cosimo II. were popular, and contributed to the prosperity of their country. But at the beginning of the 17th century the race rapidly degenerated; and, after several of its representatives had suffered themselves to become mere puppets in the hands of Austria or Spain, the family became extinct in 1737 at the death of its last male representative, Gian Gastone, the seventh grand-duke. His only sister, the Electress Palatine, the last of all the Medici, expired in 1743.

See, besides the works cited at FLORENCE, Roscoe's two well-known works on Lorenzo and Leo X.; and Reumont, *Lorenzo de' Medici the Magnificent* (Eng. trans. 1876).

Medicine. Lucretius imagines for us the first rude attempts of prehistoric man to repair the injuries received in conflict with wild beasts; and, according to Celsus, the most backward tribes have never been without their remedies for wounds and general ailments. The healing art, indeed, is coeval and co-extensive with humanity; but of its two great divisions—surgery and medicine—the former, as will be shown in its proper place, was incomparably the earlier, and, in practice, the more effective.

Egypt furnishes the earliest indications of medical art. The Papyrus-Ebers was written 3500 B.C., and is entitled *Book of the Preparation of Medicines for all the Corporeal Parts of Individuals.* In it formal invocations of a blessing on those medicines are followed by prescriptions and the names of the maladies they cure—disordered evacuation, intestinal worms, &c., while prominence is given to an obscure wasting-fever called 'uchet.' Anatomy, in its strict sense, was unknown to the Egyptians; and their medicine, while empirical, was highly specialised. Every physician belonged to a sacerdotal college, and the sick had recourse to the nearest temple, whence they procured the practitioner best suited to their case. The fees took the form of gifts to the temple, from the revenue of which its medical staff was maintained. Till Hippocrates appeared the physicians of Egypt were the most famous; but with her subjection by Alexander the Great, and the sway of the Ptolemies, her medicine gradually succumbed to the Greek, which for centuries had one of its chief schools at Alexandria.

The Israelites were in medical practice followers of the Egyptians, and, as with them, the priesthood attended the sick. Cleanliness was the distinctive note of their medicine, till like the Egyptian it became merged in the Greek, and, later, in the Arabian.

The sacred books of the Indians containing their oldest records of the healing art—the Vedas—date from about 1500 B.C. In them sickness appears as the work of hostile, recovery of friendly deities—the remedial agents being propitiation, prayer, and the sacrificial drink *Soma* (q.v.). The next or Brahmanic period is very prolific in medical literature, its most celebrated authors being Charaka and Susruta. To what age their works belong is much debated, some orientalists placing Susruta's *Ayur-Veda* long before Christ, others as late as the 8th or

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9th centuries A.D. Just as difficult is the question whether the Indian medicine is an aboriginal product or an importation. But its earliest position was an exalted one, and its young votaries were drawn from the higher castes. Their curriculum lasted from the twelfth to the eighteenth year; decorum, piety, benevolence, unselfishness were inculcated on them as duties; and on the threshold of practice they took an oath significantly resembling the Hippocratic. Dietetics and bodily cleanliness play an important part in Indian medicine. From the vegetable, mineral, and animal kingdoms it draws remedial agents innumerable, including many antidotes to poisoning, snake-bite especially.

The old Persian medicine, as revealed in Zoroaster's *Zend-Avesta*, stood in the closest connection with religion. But Greece made her medical superiority felt in Persia, as in Egypt and India, and in later times the schools founded by the Nestorians were important centres whence Greek medicine was diffused throughout the East.

Chinese medicine meets us historically only in the 5th century B.C. Elaborate rules for noting the pulse and a portentous array of vegetable, mineral, and animal remedies are its chief characteristics. Old Japanese medicine was borrowed from it.

Greece is the mother-land of rational medicine. Already in Homer we find practitioners ranking with musicians and architects, and visiting patients for professional fees. Medicine, as distinct from surgery, is not in the Homeric foretime subordinate to religion as in the East. It has its tutelary deities—Apollo, Artemis, and Pallas, and its tutelary demigods—Æsculapius and his daughter Hygieia; but these were above and outside the medical art, while the sick who repaired to their temples were healed, not by treatment, but by such religious exercises as the 'temple-sleep,' in which they dreamt the dreams from which the priests divined their malady and prescribed the appropriate sacrifice. The service of Æsculapius had nothing to do with medicine or its practitioners, and was in the time of Hippocrates resorted to only by the superstitious among the lower orders.

Early in the Greek mainland and islands medicine had rounded itself off as a distinct science with application to practice. As a profession it became open to every free-born citizen, and included two classes—the qualified and the amateur. Its votaries began in boyhood with the study of remedial plants, the preparation of unguents, draughts, and plasters, the practice of blood-letting and minor surgery, and finally treatment at the bedside. Duly qualified, the physician took the celebrated 'oath'—and thereafter received patients in a house of his own (*iatreion*), or visited them under their own roofs, or went on circuit. The fee included the cost of prescriptions when made up—the humbler practitioners receiving it in advance; but many towns kept a physician for the public service; and in some cases physicians of eminence became attached to foreign courts. Such was the position of the medical profession when Hippocrates (460 B.C.) gathered up all that was sound in the floating doctrine and practice, and not only augmented it, but gave it a character and direction of his own.

He strikes the keynote of his school in denying to disease a supernatural origin. 'From God comes one disease as well as another; but nothing happens except in conformity with nature.' In medicine proper his method was threefold: to ascertain the past, to examine the present, and to forecast the future of the patient. After carefully noting the previous history, generally from the patient's own lips, he made a thorough review of the symptoms as the basis of a diagnosis. This review, performed preferably in the morning when the physician's faculties and senses were at their best, included the general nutrition, the bodily, particularly the facial, complexion, the temperature, the respiration, and the state of the digestion and genito-urinary systems. The pulse received quite secondary consideration. The Hippocratic diagnosis was seen to special advantage in thoracic and abdominal diseases. Percussion was not neglected; and succussion (i.e. shaking the patient to induce internal movements which were carefully listened to) was also among the aids to diagnosis. Prognosis, the third and last step in dealing with a patient, was likewise based on minute examination, and grew naturally out of the peculiarly Hippocratic doctrine of 'critical days.' Among the favourable signs were tranquil sleep, the setting in of perspiration, ease of bodily movement; while of contrary import were the *facies Hippocratica* (still the classic description of approaching dissolution), sinister revelations of the eye, the breath, the sputum, and the abdomen, with those of the excretions, particularly the urine. Dietetics hold the first place in the Hippocratic treatment. In acute cases the sustenance was the barley-ptisane, the drinks water mixed with honey, with acid, or with wine. External agents were oil, water, bay-salt in acid solution, wine, and acidulated lotions; in chronic cases diet and gymnastics, with vocal exercise in singing and declamation, sometimes the artificial production of obesity were employed. Venesection was sparingly employed—cupping more frequently. Drugs of indigenous and Egyptian, even of Indian origin, mostly in solution, were used with discrimination. See also SURGERY.

For at least a century after Hippocrates medicine advanced but little. His Greek successors, Diocles, Praxagoras, and Chrysippus, supplemented him by theorising and in a less degree by independent observation, and were for the former characteristic called Dogmatics by Galen.

The break-up of the Macedonian empire into kingdoms gave rise to so many foci of medical culture. The Alexandrian school, purely Greek in *personnel* and character, was represented by Herophilus and Erasistratus, both of them great anatomists. The former took account of the immediate causes of disease and such symptoms as the pulse and anatomical changes, while in treatment he relied mainly on drugs and venesection. The latter, much less loyal to the Hippocratic name, found in excess of nutrition with its results, dyspepsia and plethora, the chief causes of inflammation and fever. Herophilus and Erasistratus each headed a school, both called Dogmatic from their tendency to supersede their sound anatomical traditions by premature generalisation. Out of the conflict of Herophilite and Erasistratean sprang the Empirics, whose professional 'tripod' was clinical observation, previous history of the patient (*anamnēsis*), and 'transition from like to like' (analogical inference).

Rational medicine entered Rome with the Græcising wave that followed the expulsion of the learned from Alexandria and the subjection of the Hellenic world, and received a great impetus from the dictator Julius Cæsar, who extended the Roman citizenship to all in the city who professed the healing art. Among these was Asclepiades of Bithynia, recommended to the Romans by his philosophy, rhetoric, and reliance on the gymnastic already in favour with them. Regarding the human body as composed of countless atoms divided from each other by invisible interspaces (pores), he made health consist in the normal behaviour of these atoms, by which the pores retained their proper calibre, and illness in their derangement, whereby the pores were widened or narrowed. He enjoined observance of the Stoic

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maxim, to live conformably to nature, bodily exercises, including the manipulations of the bath-attendant ('massage'), and dietetics being his chief remedies. His immediate follower, Themison, simplified his etiology, and, ignoring the atoms, insisted on the abnormal condition of the pores as the one cause of disease, finding health in the *methodus* or 'middle passage' (as Häser explains it) of these channels, and the loss of health in their constriction or relaxation, or in the partial co-existence of both conditions. His therapeutics aimed at inducing a state opposite to that in which the patient was found, and so relaxation was treated with astringents, constipation with laxatives. The Methodics had the merit of ignoring mere authority, even the Hippocratic 'humoralism' still dominant, and studied the patient's general condition as the safest ground of diagnosis. Despising etiology, even in local affections, their therapeutics became an unreflecting routine. But their skill in dietetics amply explains their acceptance with the Roman world, ensuring the patient fresh air, and a pure and healthy skin, while rejecting all drastic or lowering medicines.

Aulus Cornelius Celsus, an adherent of no school and perhaps not a professional man at all, is yet the highest name in the Roman healing art, for his treatise *De Medicina*, which formed part of his encyclopædia—a sort of 'Whole Duty of the Roman Patrician.' Himself one of the order, he had doubtless to interest himself in the *ampla valetudinaria*, or infirmaries for slaves attached to every country-seat or urban palace. His experience of such hospitals enabled him to test the practice of the profession, and from the knowledge thus acquired, especially in dietetics, pharmacy, and surgery, he compiled his elegantly written book. Historically its value is priceless, as the source from which we have distinct knowledge of the Alexandrian period. He bases medicine, with Hippocrates, on anatomy, physiology, and the scientific investigation of the causes of disease, while, without excluding the hypothetical, he allows no hypothesis to influence practice. The whole work forms a compendium which, since its re-emerging to light in the 15th century, has held the first place in Latin medical literature. In the next generation to Celsus, Pliny the Elder deserves notice for his valuable, though incidental, allusions to medical authors. But to return to the Methodics. In the reign of Nero, Thessalus of Tralles was their most popular representative; half a century later Soranus of Ephesus took his place in Rome as the most distinguished of the school. His masterwork, written in Greek, is on obstetrics, while in medicine proper his treatise on acute and chronic diseases (lost in its Greek original, but preserved to us in the African Latinity of Cœlius Aurelianus, who lived about the end of the 4th or beginning of the 5th century) exhibits the Methodic practice in its most favourable light. This, though with diminishing strength, resisted even the influence of Galen, till in the middle ages it took a fresh start.

An offshoot from the Methodic school had already appeared in the 1st century—viz. the Pneumatic, which sought to reconcile it with the Hippocratic humoralism. Its originator, Athenæus, derived its central doctrine from a hypothetic pneuma or soul pervading the universe; but in practice he combined the empiric and methodic therapeutics. About the same time arose the Eclectics, whose chief representatives were Rufus of Ephesus and the much abler Aretæus of Cappadocia, who, for general culture, moral worth, and professional skill, to say nothing of the purity of his Ionic Greek, comes next to Hippocrates.

We have now reached the epoch-making Galen, born at Pergamus in 131 A.D., who, after varied studies in the Hellenic schools of the Levant, came as a qualified practitioner to Rome in 164. His rapid success aroused the jealousy of the profession there, and he again travelled in the East, to be recalled to Rome by the emperors Lucius Verus and Marcus Aurelius. He found medicine speaking a Babel of tongues while claiming to be a science, and posing as a profession. He sought to rehabilitate it by restoring to anatomy and physiology the value withheld from them by Empirics and Methodics, and by reinforcing practice with the discoveries of the Alexandrian school; in other words, to make diagnosis scientific by basing it on anatomy and physiology, and to reconstruct therapeutics by an unprejudiced clinical experience. His guide was Hippocrates—the treatise on Prognostics in particular; but unhappily he abandoned the sound Hippocratic method, and tried to unite professional to scientific medicine with a philosophic link. This he found in a hyper-idealistic Platonism, from which he evolved a teleological system which provided every question with an answer and every riddle with a solution. Hence arose a plausible appearance of infallibility, which kept medicine in chains till the 17th and 18th centuries. Adopting the Hippocratic view of the corporeal elements as consisting of the solid, the liquid, the warm, and the cold, he found them blended equally in the blood, while in the bile the warm predominated, in the phlegm the cold. His vivifying principle, the *pneuma*, reaches in man its highest development as the 'psychical,' the 'vital,' and the 'natural' spirit, and manifests itself in 'spiritual,' 'pulsating,' and 'natural' force. The processes regulating nutrition and structure he explained by attractive, secretive, propulsive, and expulsive powers. Recognising, however, that these do not cover all physiological processes, he added to them the occult powers of the 'whole substance,' the 'specific qualities' of his later followers; thus opening the sluice-gates to every kind of superstition.

Disease he ascribed, first, to immediate causes (such as plethora and corruption of the juices); next, to the disturbance thence arising; next, to the abnormal structural processes started by such disturbance; and finally, to the symptoms. Maladies he distributed according to their anatomical substratum: (1) those of the elementary substances (blood, phlegm, yellow and black bile); (2) irregularities of homogeneous substances (tissues), which, again, fall into anomalies of the physical condition (strain and atony), and of the primal qualities (warm, cold, &c.); (3) ailments of special organs. For the Hippocratic 'crudity,' 'coction,' and 'crisis,' manifested only in acute disease, he substituted the 'beginning,' the 'progress,' the 'culmination,' and the 'decline;' but retained the doctrine of crises and critical days; and he agreed with Hippocrates that the recuperative principle is nature, working necessarily through the attractive, transforming, and expulsive powers. He originated the doctrine of 'indications' in their bearing on the prevention of disease; on its character, stage, type, symptoms; on the idiosyncrasy of the patient and the nature of the affected organs—even on his dreams. Diet, gymnastics, baths, friction, and blood-letting formed his main therapeutics. Consistently, with his theories he classified medicines, according to the prevalence of one or more elements, into simple, compound, and those operating through their 'whole substance' (emetics, for instance, purgatives, poisons and their antidotes). In his own practice he preferred simples, and set peculiar value on opium, introduced by the Alexandrian school. It was not till after

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his death that his influence began to prevail. His comprehensiveness, his prolix style, and sectarian jealousy kept his authority in the background, and it was with the philosophers rather than the profession that he was most in favour. Gradually his writings, having been translated into Latin, began to be studied in the West, till in the 6th and 7th centuries they were much in vogue. But it was the physicians of the Nestorian creed, expelled from Byzantium, who became his true apostles. Revering him for his teleology and almost Christian worship of a benevolent creator, they diffused his name and authority till the Arabian physicians became his devoted adherents, and spread his influence through East and West alike for more than a thousand years.

After Galen may be noticed the Byzantine school—viz. the compilers Oribasius (physician to Julian the Apostate), Aetius, the abler Alexander of Tralles, and the yet more independent Paul of Ægina. In the West Cœlius Aurelianus, above referred to, alone redeems medicine from the deterioration it had reached in the hands of herbalists and receipt-mongers.

Arabian medicine arose out of the Greek in those Hellenic cities which had passed under Moslem sway. Its importance begins with the Persian Rhazes (925–26), a follower of Galen, though not unacquainted with Hippocrates, practising in Bagdad. After him may be mentioned Mesua the younger, of Damascus, whose materia medica, dating from the 11th century, was much in vogue and was used by the London College of Physicians in framing their pharmacopœia in the reign of James I., and Abulcasis, author of a medical cyclopædia. Haly, compiler of the 'Royal Book,' was the standard Arabian writer till Avicenna, who, famed also as a philosopher, is the highest name in Arabian medicine. His 'Canon,' lucid in style and method, is an encyclopædia of the healing art, based on Aristotle, Galen, and his successors, Greek as well as Arabian, but evincing no clinical experience or research. His opponents were Avenzoar and the latter's pupil Averrhoes, compilers mainly, as was also the great Rabbi Maimonides, the last noteworthy writer on Arabian medicine. No advance was made by this school on the Greek, except in the description of smallpox and measles and, more distinctly, in pharmacy and the virtues of drugs. The Arabs owed this superiority to their chemical skill, which originated new or modified old remedies, and also to their more familiar relations with the East, imperfectly gleaned by their predecessors. Apothecaries' shops, and even the pharmacopœia, are among the innovations medicine owes to them.

European medicine, however, manifests no real break from its rise under Hippocrates. In the early middle ages the religious orders were the custodians of the degenerate knowledge and practice of the healing art transmitted from the later Roman authors till the curious mixture of ancient science with the black art, characteristic of monastic medicine, was superseded by the Benedictines, whose house at Monte-Cassino in Campania was the seat of the Hippocratico-Galenic revival, afterwards extended by the school of Salerno. This latter was a non-religious establishment, in which law as well as philosophy was taught, while the preponderance it gave to medicine as early as the 9th century earned for it the name of 'Civitas Hippocratica.' It attracted prominent men of the time in quest of health, among them the Norman invaders of Southern Italy. William the Conqueror was one of the visitors, and his son Robert is supposed to have been the king of England for whom was written the famous *Regimen Sanitatis Salerni*, the rhyming Latin poem on 'health and the means of maintaining it,' which afterwards circulated so widely through Europe. The Salernitan school had many students, and, proportionately, a considerable staff of teachers, some of whom were women, their wives and daughters; the best known of them is Trotula (11th century), wife of Joannes Platearius, first of a medical family bearing that name, and author of *Practica*, a manual of medicine which long held its ground. But none of the Salernitan writers are other than compilers, chiefly from Hippocrates, Galen, and their successors. Diet was their sheet-anchor, though their pharmacy improved on the previous European standard, and their clinical teaching was also favourable to rational medicine. But the Arabian wave swept over the school, and, after the 13th century, almost obliterated it. It survived, however, though but the shadow of a name, till its suppression in 1811 by Napoleon.

Latin renderings of the Arabian compilers were the main channel through which Europe recovered its knowledge of the classical medical writers—Constantine Africanus (1050) being the earliest of these translators. Transmitted through the Arabic, the Greek medicine wore an eastern dress, and in such guise it found its way to Montpellier, a school which developed as that of Salerno waned. Bologna and Padua, too, derived their medical teaching from this oriental travesty of the Greek; but no great independent authority arose in any of these seats of learning. Häser points out that the practical tenor of the treatises they put forth—notably the Montpellier school—was due to British authors, who, like Gilbert the Englishman, and Gordon the Scot, had graduated there. But the fall of Constantinople and the immigration of Greek scholars into Europe reopened the fountains of ancient learning. Hippocrates and Galen now became known in the original, and the masterwork of Celsus, till then a forgotten book, was once more read with profit. Rational medicine had returned to its parents.

To the writings of Galen was due the revived study of anatomy, and with it physiology; to Dioscorides the resuscitation of medical botany. The discovery of America, followed up by inland exploration, led to the introduction of new medicines, vegetable and mineral. The reaction against the Arabian masters was completed by 'authorised versions' of the Greek originals—versions chiefly the work of physicians who were also Hellenists, and by the middle of the 16th century Galen was re-enthroned in the schools. The downfall of Arabian medicine was of earlier date in Italy and England than in France, while Germany was under the temporary sway of Paracelsus, a meteoric genius who followed no school, but vitiated his independence of judgment and great acuteness by the haughtiest arrogance. He had a positive as well as a mystical side, and, while regarding disease as 'spiritual,' with which, unassisted, nature herself could often cope, he also relied on chemical agencies for its cure. These owed their virtue to their secret power over disease, whence he called them 'arcana.' Opium, in the form of tincture, and antimony were among these. Beyond compelling a closer study of chemistry and showing an example of independence amid the universal belief in Galen, Paracelsus did no good to medicine, and indeed, outside Germany, was held in little account.

Meanwhile, the outbreak of disease on an epidemic scale, in forms unknown to the Greeks, threw the medical art on its own resources, and started that revolt against authority to which it owed its next advance. The sweating sickness was minutely described by Kaye (Latinised, Caius) in England, and syphilis by physicians on the

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Continent. Hospitals, moreover, the special contribution of Christianity to the relief of the sick or physically injured, now became seats of clinical study, Italy leading the way in her celebrated school of Padua, which then began to attract students from all countries. Physics, which received a fresh impulse at the Renaissance, had also its effect on biology and medicine—Galileo and Cæsalpinus representing in Italy what Bacon and Harvey represented in England—a sounder scientific method on the one hand and a more penetrating physiological research on the other, leading to the discovery by Harvey of what Cæsalpinus and others had dimly adumbrated, the circulation of the blood. Concurrently with the mechanical contribution to biological and medical study, that of natural history was equally important, pharmacy in particular receiving new accessions, notably cinchona bark, which found a place in the dispensatories or pharmacopœias now beginning to multiply. Love of system, however, a perennial hindrance to medical progress, was no less prolific than inductive research, and so, contemporaneously with Harvey, we have mystics such as Van Helmont, who, like Paracelsus, left no enduring mark on sound medicine beyond encouraging independence of authority and innovations in treatment. The Iatro-mechanical school was another development in the theorising direction, its most prominent names being the Neapolitan Borelli, the Roman Baglivi, and the Scottish Pitcairne. Physiology is more indebted to these quasi-scientific systematisers than therapeutics, which, however, is under distinct obligations to another school, the Iatro-chemical, whose Dutch founder, Sylvius, applied to treatment the results of the improved biology and chemistry. He had many followers in Germany as well as Holland; but his ablest disciple was the English Willis, who worked permanent good in the examination of secretions, to say nothing of his still classic account of diabetes and of nervous maladies. Reaction against the theorising tendency was led by Sydenham, whose guide in practice was Hippocrates, with his 'natural history of disease.' Nature he held to have a self-restoring power, which it was the physician's duty to watch and assist. As a practitioner Sydenham was especially great, while his descriptions of disease—gout, for example—are those of an artist in medicine. But it was in his rejection of theory and as an observer and utiliser of facts that his influence was soundest. Coming as it did after the anatomical, physiological, and chemical work of the previous generation, it gave practical direction to so much of it as had stood the clinical test.

Theory, however, is too attractive for ingenious minds to be long idle, and again we find medicine turning into 'the high *priori* road.' The Iatro-mechanical school underwent something like a revival, thanks to the brilliant astronomy of Newton and the able advocacy of Pitcairne and his pupil Cheyne. Sydenham's example, however, was still powerful enough to curb the theorising tendency, so that enthusiastic mathematicians like Mead did not allow their love of hypothetical symmetry to vitiate their practice. The next great name in medicine is that of Boerhaave of Leyden, a disciple of Hippocrates and Sydenham, familiar with all that was valuable in other schools, but strenuous in his pursuit of anatomical and physiological fact, in which he worked assiduously with the microscope. As a clinical lecturer he was the forerunner of the most refined teaching of the modern day, and his clinique was resorted to by aspiring students of every country. The love of system which he shared with so many of the master-minds of medicine is seen in his *Institutiones*, long a text-book, but now, like his *Aphorisms*, superseded by the juster knowledge of which he was the pioneer. Among his pupils was Van Swieten, founder of the Vienna school, while contemporary with him were Hoffmann and Stahl, both of them professors at Halle, in advance of their time as chemists, and enthusiastic systematisers, the former eager to reconcile the 'spiritual' with the 'materialistic' view of nature, the latter bent on eliminating the 'material' from man and making the 'psychical' the essence of his being.

Physiology and rational medicine made a new start under the all-accomplished Swiss Von Haller, whose teaching prevailed for good in spite of recurrent outbreaks of the systematising tendency. Muscular irritability, to the exclusion of the hypothetical *anima*, and as distinguished from nervous sensibility, was a discovery of his which threw fresh light on living movements, while medicine proper owes to him a series of experiments, better appreciated by later science, on the influence of drugs on the healthy subject. Morgagni of Bologna laid practical medicine under yet more lasting obligations by his elaborate work in morbid anatomy, of which he may almost be regarded as the creator. His *De Sedibus et Causis Morborum* may still be consulted with advantage, followed up as it was and its results extended by other pathologists, the Scotsman Baillie in particular. From the sound leading of Von Haller and Morgagni a partial deflection was made by Cullen of Edinburgh, an expositor of rare ability. His *Lines of the Practice of Physic* and his larger *Nosology* were a skilful adaptation of the new physiology and pathology to classification and therapeutics, and from their attractive clearness were long in favour with teacher and student alike. A more brilliant, though far less judicious systematiser was his pupil John Brown, father of the Brunonian system, of which the keynote is the part played by 'excitability' in health and disease. To maintain this property at its normal strength was the object of the physician, who, indeed, in 97 per cent. of the diseases brought before him, had to make his treatment a 'stimulating' one. The superficial simplicity of the system explains its wide acceptance and tenacious vitality, though its popularity was always greater in Italy and Germany than in Great Britain. Another exemplar of the systematising spirit in the same century was Hahnemann, the creator of the Homœopathic school. Dwelling chiefly on the symptoms of disease, he constructed an elaborate scheme of therapeutics (see HOMŒOPATHY), and benefited practical medicine, even as Brown did, by favouring a milder than the so-called heroic treatment.

Before quitting the 18th century, its contributions to special departments of medicine must be noticed. In Italy Valsalva and Lancisi did good service, the latter by his observations on the causes of sudden death, including cardiac and aneurismal lesions, while Albertini was also meritorious in the same walk. Germany produced Auenbrugger of Vienna, author of direct 'percussion.' In Britain state-medicine owes its start to Baker, followed up by Jenner, whose discovery of vaccination is memorable not only for its prevention of smallpox, but for its influence on the study of infectious disease. Pringle, ably preceded by Huxham, enlightened the profession on fevers, especially as occurring in prisons and camps; and Fothergill on putrid sore throat ('diphtheria') and ticdouloureux, and Heberden in therapeutics did honour to the English school.

The 19th century opened with a sound preference for inductive research over premature generalisation, and France, in the background for many

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years, now came to the front with Bichat and Broussais—the former a great anatomist and physiologist, the latter distinguished in pathology. Pathological anatomy had contributed much to localise disease, and diagnosis was made still more precise by Corvisart and Piorry in perfecting the 'percussion' of Auenbrugger. By Laennec's advance upon this—auscultation to wit—the movements of the lungs and heart are heard through the thoracic walls by the stethoscope. Concurrently with this 'mediate auscultation,' morbid anatomy connected the lesions of the intra-thoracic viscera with the sounds so transmitted—a twin-source of medical knowledge, rich in results on diagnosis and treatment. Bayle, Chomel, Louis, Cruveilhier, and Andral, each in his own way, did memorable work in scientific and practical medicine, founding the great clinical school which, continued under Bretonneau, Rostan, D'Alibert, Rayer, and Trousseau, made Paris the resort of aspiring young physicians from both hemispheres. In Great Britain medical education was steadily improved by sounder chemical and physical, as well as anatomical and physiological knowledge, while the preference of rational observation to theory was admirably illustrated by Willan on the skin, Bright on the kidney, and Addison on the supra-renal capsules. The Paris school found apt pupils in the British Islands—the Scottish Forbes and the Irish Stokes, with the English Hope, Latham, and Watson, doing much to diffuse a sounder diagnosis and treatment of chest diseases; while Scotland, in particular, maintained the traditional celebrity of her clinique by Gregory, Abercrombie, and Alison in Edinburgh, to whom worthy counterparts were produced in Dublin by Graves, Stokes (already mentioned), and Corrigan. In the northern capital Christison, the Begbies, father and son, Hughes Bennett, and Laycock upheld the fame of the school, and south of the Tweed Parkes, Murchison, Hilton Fagge, and Jenner have bequeathed a rich harvest of practical doctrine to their successors. Italy, with Galvani, Volta, Nobili, and Matteucci, is the parent of electro-therapeutics; but it is to Germany that recent medicine owes its greatest and most productive achievements. Vienna, under Van Swieten and Auenbrugger, had already won a European name for clinical research when Skoda enhanced it by improving on Laennec's discovery, and Rokitansky and, quite recently, Bamberger carried Viennese teaching to the highest pitch of academic efficiency. Romberg is another representative name; but Schönlein, by the unanimous voice of Germany, has placed her in the van of medical progress. Founder of the modern 'natural history school,' his teaching has led up to bacteriology, which already in the hands of such men as Pasteur and Koch has for cholera, malaria, lupus, and tuberculosis (see TUBERCLE) become one of the most powerful instruments of which medicine, in diagnosis and even in practice, has yet been able to boast. The marvellous advances in cerebral physiology, from Broca to Hitzig and Ferrier, have had great results in practice, surgical as well as medical; and the Americans have done splendid work, especially in therapeutics.

Häser's *Grundriss der Geschichte der Medicin* (Jena, 1884) and Puschmann's *Geschichte des medicinischen Unterrichts* (Leip. 1889) have been closely followed in the foregoing article. The student who wishes to pursue the history of medicine into minuter detail should consult the larger work of Häser, in 3 vols. (Jena, 1875–79); Daremberg's *Histoire des Sciences Médicales* (2 vols. Paris, 1870); and Puccinnotti's *Storia della Medicina* (3 vols. Pisa, 1859). For a key to the very numerous articles on diseases, see DISEASE, and the list appended to ANATOMY. See also SURGERY, HYGIENE, BACTERIA, GERM THEORY, and the notices of HIPPOCRATES, GALEN, and other great physicians.

Medick (*Medicago*), a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, nearly allied to Clover (q.v.), but distinguished from that and kindred genera by the sickle-shaped, or, in most species, spirally-twisted legume. The species, which are very numerous, are mostly annual and perennial herbaceous plants, with leaves of three leaflets like those of clover, and are natives of temperate and warm climates. A number of them are found in Britain, and many more in the south of Europe. They generally afford good green food for cattle, and some of them are cultivated like the clovers for this use, amongst which the most important is the Purple Medick, or Lucerne (q.v., *M. sativa*). Besides this, the Black Medick, Nonsuch, or Lupuline (*M. lupulina*), is one of the most generally cultivated. It is a common native of Britain, where it is very generally sown mixed with Red Clover and Rye-grass, and is useful where a close turf is desired.

Medi'na, EL- (Arabic for 'The City'), or, more fully, Medinat en-Nebi ('City of the Prophet'), or Medinat Rasuli-elah ('City of the Apostle of God'), because it was there that Mohammed took refuge after his Hegira or Flight from Mecca in 622, and there that he lived till his death. Formerly called Yathzib, and mentioned by Ptolemy as Iathrippa, the holiest city of the Mohammedan world after Mecca, and the second capital of the Hedjâz in western Arabia, it is situated about 270 miles N. of Mecca, and 132 N. by E. of the port of Yanbu' on the Red Sea, and contains about 16,000 inhabitants (Burton), chiefly engaged in agriculture. It consists of three principal parts—a town, a fort, and suburbs of about the same extent as the town itself, from which they are separated by a wide space (the Munakha). It is about half the size of Mecca, and forms an irregular oval within a walled enclosure, 35 to 40 feet high, flanked by thirty towers, and enclosing the castle where the Turkish garrison is lodged—a fortification which renders it the chief stronghold of the Hedjâz. Two of its four gates are massive buildings with double towers. The streets are narrow but partly paved. The houses are flat-roofed and double-storied, and are built of stone, brick, and palm-wood. The principal building is the Prophet's Mosque El-Haram ('the Sacred'), supposed to be erected on the spot where Mohammed died, and to enclose his tomb. It is of smaller dimensions than that of Mecca, being a parallelogram, 420 feet long and 340 feet broad, with a spacious central area, surrounded by a peristyle with numerous rows of pillars. The present building is, however, only the last of many reconstructions, of which the best was that of Kait Bey, the Mameluke sultan, in 1481, whose dome and pulpit still stand. The Mausoleum, or Hujrah, is an irregular doorless chamber, 50 to 55 feet in extent, situated in the south-east corner of the building. It is surmounted by a large gilt crescent above the 'Green Dome,' springing from a series of globes, and hedged in with a closely-latticed brass railing, in which are small apertures for prayer. The interior is hung with costly curtains embroidered with large gold letters, stating that behind them lie the bodies of the Prophet of God and of the first two califs—which curtains, changed whenever worn out, or when a new sultan ascends the throne, cover a square edifice of black marble, in the midst of which is Mohammed's tomb. Its exact place is indicated by a long pearly rosary—still seen in 1855—suspended from the curtain. The Prophet's body is believed to lie undecayed at full length on the right side, with the right palm supporting the right cheek, the face directed towards Mecca. Close behind him is placed, in the same position, Abubekr, and behind him Omar; and Fâtimeh's house

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is represented by a modern erection hard by. There seems no reason to doubt that the Prophet was buried in the space (originally Ayeshah's hut) now enclosed in the mosque; nor is it likely that the grave was ever rifled. That his coffin, said to be covered with a marble slab, and cased with silver (no European has ever seen it), rests suspended in the air is of course an idle Christian fable. Of the treasures which this sanctuary once contained, little now remains. It is a meritorious act to perform the pilgrimage to Medina, though there is no fixed season for it. As in Mecca, a great number of ecclesiastical officials are attached in some capacity or other to the Great Mosque; and not only they, but many of the towns-people live to a great extent on the pilgrims' alms and custom. There are few other noteworthy spots in Medina, save the minor mosques of Abu-bekr, 'Ali, 'Omar, Bilal, &c. Thirty Medressehs, or public endowed schools, represent what learning there is left in the city, once famed for its scholars and theologians. In the 7th century Medina was the capital of Islam; but since then it has passed under the rule of emîrs, sherîfs, Turkish pashas, and Wahâbis, though the internal government of the city is still Arabian.

Medina Sidonia, a city of Spain, 25 miles SSE. of Cadiz, stands on an isolated hill overlooking a wide plain, and has the ruins of a castle, the ancestral seat of the dukes of Medina Sidonia, descendants of Guzman the Good, conqueror of Tarifa (1292). It was a member of this house who commanded the 'invincible Armada' (q.v.). Pop. 12,397, who make pottery.

Medinet-el-Fayyum. See FAYYÛM.

Meditatio Fugæ. See DEBT, Vol. III. p. 717.

Mediterranean Sea, so named from lying in the midst between the continents of Europe, Asia, and Africa. It is the largest enclosed sea in the world, and is connected with the open ocean only by the narrow Strait of Gibraltar, 9 miles in width at the Pillars of Hercules. Since 1869, however, it has been artificially connected with the Red Sea and Indian Ocean by means of the Suez Canal (q.v.). From its great size the Mediterranean might be ranked with the oceans, but from being so completely cut off it presents distinctly local characters when compared with the great ocean-basins, and is consequently of special interest to the student of physical science. The Mediterranean, in a nearly east and west direction, is about 2200 miles in length from the Strait of Gibraltar to the Syrian coast; its width varies from 500 or 600 miles in some places to less than 100 miles between Sicily and Cape Bon, where it is divided by relatively shallow banks into two distinct hydrographic basins, the eastern one being the larger. It is connected with the Black Sea through the Dardanelles, the Sea of Marmora, and the Bosphorus. The African and Syrian coasts are comparatively even and unindented, the wide gulfs of Gabes and Sidra scarcely presenting an exception; on the other hand, the shores of Europe and Asia Minor are cut up into numerous gulfs and bays, the largest of which is the Adriatic Sea. Various parts of the Mediterranean have been known by special names, such as the Tyrrhenian and Iberian Seas in the western, and the Levant, Ægean, and Ionian Seas in the eastern basin. The principal islands in the western part are Sardinia and Corsica, the Balearic and Lipari Islands, the two latter groups being of volcanic origin. The continental islands of Sicily and Malta are situated on the banks dividing the two basins; Pantellaria, Limosa, and Graham Island (now reduced to a shoal) are, however, volcanic though situated on the same banks. In the eastern regions there are the large islands of Cyprus and Crete, with the Ionian Islands and the islands of the Archipelago. The Mediterranean is frequently subject to earthquakes, and Vesuvius, Stromboli, and Etna are among the most famous of its active volcanoes. The scenery of the shores of this great inland sea is varied, mountain-ranges and high tablelands predominating. Although there is considerable diversity between the climates of Northern Italy and the desert shores of North Africa, still the terrestrial fauna and flora are not markedly distinct in the different regions of the Mediterranean basin, many of the plants and animals being identical on the northern and southern shores, and there is abundant evidence that this similarity was much more pronounced in recent geological times. The countries bordering the Mediterranean have been the cradle of civilisation, Phœnicia, Greece, and Italy having been successively the homes of knowledge and progress, and at the present time this inland sea is commercially the most important waterway of the world.

The area of the Mediterranean is estimated at about 900,000 sq. m., or, including the Black Sea and Sea of Azov, at 1,053,000 sq. m. The area of land draining into the Mediterranean is estimated at 2,969,350 sq. m., or nearly 3,000,000 sq. m. of the richest country on the earth's surface. The annual amount of rain that falls on this land is estimated by the writer at 1598 cubic miles, and of this amount about 226 cubic miles reach the Mediterranean through the annual discharge of rivers, the principal of which are the Rhone, Po, Danube, Dnieper, Don, and the Nile.

The basin of the Mediterranean commences about 50 miles to the west of Gibraltar, where there is a ridge with a maximum depth of about 200 fathoms. There is a similar depth on the ridge between Sicily and Africa which separates the Mediterranean into two basins: 2040 fathoms is the greatest depth recorded in the western, and 2187 fathoms the greatest in the eastern basin; the mean depth of the whole sea is 768 fathoms. The area of the sea-bottom with a less depth than 100 fathoms is estimated at about one-fourth of the whole area; the area with a depth of from 100 to 1000 fathoms is estimated at 300,000 sq. m., and with a depth of from 1000 to 2000 fathoms at 15,000 sq. m. The bulk of water is estimated at 709,800 cubic miles. The greatest depth in the Black Sea is 1070 fathoms, the average depth being 412 fathoms.

On the whole northerly winds prevail over the Mediterranean, due chiefly to the influence of the anticyclonic region of the North Atlantic, although in the eastern portions the alternate cyclonic and anticyclonic area of northern Asia has a distinct influence on the direction of the winds. The Mediterranean lies wholly between the annual isotherms of 60° F. in the north and 70° in the south. The temperature of the surface waters may occasionally reach 90°, but is usually much less, the mean of the winter months being between 53° and 57°. Generally the temperature of the sea is higher than that of the air, especially in winter, but in some of the summer months the reverse is the case. Whatever the temperature of the surface water may be, at a depth between 100 and 200 fathoms a temperature of 54° to 56° is met with, and this persists without sensible variation to the greatest depth. The temperature of the bottom water in the western basin is about 54°·5, and in the eastern basin a little warmer, 56°·0, these temperatures being fully 20° higher than the temperature of the bottom water of the Atlantic at corresponding depths. From recent observations it would appear that the deep water of the Mediterranean is subject to slight annual variations, dependent on the temperature of the previous

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winter. The evaporation from the surface of the Mediterranean exceeds both the precipitation and the annual discharge of the rivers flowing into it from the surrounding catchment basin, for we find the specific gravity of its waters (1·02800 to 1·0300) to be greater than that of the Atlantic on the west (1·026 to 1·027), or that of the Black Sea on the east (1·012 to 1·014). There is even an outflow of warm dense Mediterranean water into the Atlantic beneath the lighter Atlantic water which flows in at the surface through the Strait of Gibraltar. There is a similar state of things at the entrance of the Black Sea, where there is an inflow of fresh water from the Black Sea at the surface, and an outflow in the opposite direction of salter Mediterranean water by an undercurrent. Were it not for the inflow of Atlantic water the Mediterranean would slowly become salter, and shrink till reduced to two salt lakes like the Dead Sea. The Mediterranean is usually called a tideless sea. At Algiers there is a rise of 3½ inches at springs and half that amount at neaps; at other places the rise and fall is about 18 inches, and in the Gulf of Gabes the range reaches 5 feet, but the solilunar tides are as a rule completely masked by the rise of level and the surface currents produced by the action of the winds. The deposits now forming in the Mediterranean in deep water are all blue muds, with a yellowish upper layer, containing usually from 10 to 30 per cent. of carbonate of lime, which principally consists of the shells of pelagic Foraminifera. The mineral particles and clayey matter are derived from the disintegration of the neighbouring land. In some of the shallower depths there are glauconitic and more calcareous deposits. The deep-sea dredgings show that life, though present, is much less abundant in deep water than at similar depths in the open ocean, in which respect the Mediterranean agrees with enclosed seas in general. There is an extensive red coral fishery and tunny fishery on some parts of the coasts. The Mediterranean region appears to have been covered by the sea from early geological times, and during Tertiary times must have had much wider communication with the open ocean.

Medjidie, an Ottoman decoration, instituted in 1852 by the Sultan Abd-ul-Medjid as a reward of merit either civil or military. It was conferred after the Crimean campaign, to a considerable extent, on British officers. The order consists of five classes, and the decoration is a silver sun of seven triple rays, with the device of the crescent and star alternating with the rays.

Medlar (*Mespilus*), a genus of trees or shrubs of the natural order Rosaceæ, sub-order Pomeæ, having a 5-cleft calyx with leafy segments, nearly round petals, a large honey-secreting disc, and 2–5 styles, united together in the flower, but widely separated on the fruit, the upper ends of the bony cells of which are exposed. The Common Medlar (*M. germanica*), a small tree, spiny in a wild state, but destitute of spines in cultivation, is a native of the south of Europe and of the temperate parts of Asia, but is a doubtful native of Britain, although it is to be seen in hedges and thickets in the southern parts of England. It has lanceolate, undivided leaves, solitary large white flowers at the end of small spurs, and globular or pear-shaped fruit. The medlar is much cultivated in some parts of Europe, and is common in gardens in England, but it does not generally ripen well in Scotland without a wall. It is very austere, but when *bletted*, or its tough pulp has become soft and vinous by incipient decay, it is relished by many.

Medmenham, a village of Buckinghamshire, near the Thames, 3 miles SW. of Marlow. Here stood a Cistercian abbey (1204); and here, soon after the middle of the 18th century, Sir Francis Dashwood, afterwards Lord le Despencer (1708–81), founded his mock brotherhood of 'Franciscans,' whose motto was the familiar inscription on Rabelais' abbey of Thelema, 'Fay ce que voudras,' and two of whose twelve members were John Wilkes and Paul Whitehead the poet. Pop. of parish, 336. See W. Fraser Rae's *Wilkes, Sheridan, Fox* (1874).

Médoc, a district in the French department of Gironde, famed for the quantity and excellence of the wine it yields, some of the most famous growths of Bordeaux (q.v.), such as Château-Margaux, Château-Lafite, and Château-Latour. The district lies on the left bank of the estuary of the Gironde, being separated from the Landes by low hills, and is 40 miles long by from 5 to 10 wide. See *Chambers's Journal* (March 1890).

Medulla Oblongata. See BRAIN.

Medusæ. See JELLY-FISH.

Medway, a river of Kent, rising in three headstreams in Sussex and Surrey, and flowing 70 miles north-eastward (including 12 miles of estuary), past Tunbridge, Maidstone, Rochester, Chatham, and Sheerness, until it joins the estuary of the Thames. It is tidal and navigable to Maidstone, but large vessels do not ascend above Rochester bridge. See CHATHAM.

Meeanee, or MIANI, a village in Sind, India, on the Indus, 6 miles N. of Hyderabad, was the scene of a battle between Sir Charles Napier with 2800 men and a Baluch army, 22,000 strong, on February 17, 1843. The latter were totally routed, losing 5000 men; the British loss was 256. The result of this victory was the conquest and annexation of Sind.

Meerane, a prosperous manufacturing town of Saxony, 43 miles by rail S. of Leipzig. From an unimportant, small country town, it has increased rapidly in size and importance through the development of its woollen manufactures and the large export trade which it carries on with England, France, and America. Pop. (1849) 7345; (1885) 22,013. See Leopold's *Chronik von Meerane* (1863).

Meercat (*Cynictis*), a South African carnivore akin to the Ichneumon (q.v.).

Meerschaum (*Sepiolite*), a mineral existing in many parts of the world. In Europe it is found chiefly at Hrubschitz in Moravia, and at Sebastopol and Kaffa in the Crimea; and in Turkey in Asia it occurs abundantly just below the soil in the alluvial beds of several districts—especially at Eski-shehr. It is also found in Spain and South Carolina. Meerschaum, from its having been found on the seashore in some places, in peculiarly rounded snow-white lumps, was ignorantly imagined to be the petrified froth of the sea, which is the meaning of its German name. Its composition is silica, 60·9; magnesia, 26·1; water, 12·0. Almost all the meerschaum found is made into tobacco-pipes, in which manufacture the Austrians have been for a long time pre-eminent. Vienna contains many manufactories, in which some very artistic productions are made; and pipes worth 100 guineas, from the beauty of their design, are by no means uncommon. The French pipe-makers have lately used meerschaum, and have displayed great taste in their works. When first dug from the earth, meerschaum is quite soft and soap-like to the touch, and as it lathers with water, and removes grease, it is employed by the Turks as a substitute for soap in washing. Similarly in Algeria it is sometimes used in place of soap at the Moorish baths. The waste in cutting and turning the pipes was formerly thrown away, but it is now

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reduced to powder, mixed into a paste, and compressed into hard masses, which are carved into inferior pipes.

Meerut, or more correctly MERATH, a town, district, and division in the North-western Provinces of British India. The *town* lies 40 miles NE. of Delhi, about half-way between the Ganges and the Jumna. Its most important edifice is the English church, with a fine spire and an excellent organ. There are also several ruins of native edifices. Here in 1857 the great mutiny broke out (see INDIA, Vol. VI. p. 119). Pop. (1881) 99,565, of whom 38,617 were in the cantonment, an important military station, the rest in the city. The *district* has an area of 2379 sq. m.; pop. of (1881) 1,313,137. The *division* has an area of 11,320 sq. m.; pop. (1881) 5,141,204.

Megaceros. See ELK.

Megalichthys (Gr., 'great fish'), a genus of extinct Ganoid fishes. Their remains found in Carboniferous strata testify to fishes of large size, completely bucklered by big strong smooth scales. The jaws bear large conical teeth suggestive of predacious carnivorous habits, and the fishes were doubtless a terror in their ancient haunts. Along with related genera, Megalichthys is placed not far from the modern genus Polypterus.

Megalithic Monuments. See DOLMEN, STANDING STONES, STONE CIRCLES, &c.

Megalonyx, a large fossil edentate of the United States, smaller than the Megatherium (q.v.).

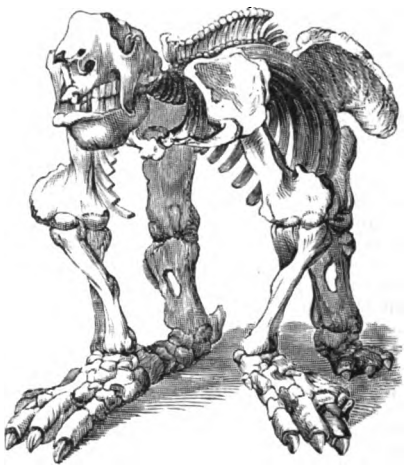
Megalosaurus (Gr., 'great lizard'), a gigantic extinct reptile, whose remains are found in Jurassic and Cretaceous strata. The huge body seems to have measured about 30 to 50 feet in length, and from the nature of the skeleton it is inferred that the animal moved and sat half upright, in a kangaroo-like fashion. The formidable teeth indisputably suggest a carnivorous diet. See REPTILES.

Megapodidæ. See MOUND BIRDS.

Megaris, a small mountainous region of Hellas, or Greece proper, lying between Attica and the Isthmus of Corinth. The people were excellent sailors, and founded several colonies, of which the most famous were Byzantium (667 B.C.), Chalcedon, and Megara (Hyblæa) in Sicily. They were generally regarded as guilty of deception and dissimulation, hence the phrase 'Megarian tears.' The capital was Megara, long an important commercial city, and famous for its white shell marble, and for a white kind of clay, of which pottery was made.—From Euclid (q.v.) the philosopher, who, as well as Theognis the poet, was born at Megara, the Megaric school took its name.

Megas'thenes, a Greek ambassador stationed by Seleucus Nicator (306–298 B.C.) at the court of Sandrocottus (q.v.), or Chandra Gupta, in the valley of the Ganges. Here he gathered materials for his work *Indica*, from which Arrian, Strabo, and others borrowed. The fragments that remain have been edited by Schwanebeck (1846) and Müller (1848).

Megatherium (Gr., 'great beast'), a gigantic extinct quadruped of the order Edentata, nearly allied to the sloth, found in the Pleistocene deposits of South and North America, but more particularly in those of the South American pampas. In structure it is very near its modern representative, except that the whole skeleton is modified to suit the requirements of an immense heavy-boned and heavy-bodied animal, fully equal in bulk to the largest species of rhinoceros. The appellation tardigrade, which Cuvier applied to the sloth, cannot be given to the Megatherium: its limbs were comparatively short and very strong, and the feet adapted for walking on the ground, approaching in this respect nearer to the allied ant-eaters, but with this peculiarity, that the first toe of each of the hind-feet was furnished with a large and powerful claw, which was probably used as a digger to loosen roots from the soil, and enable the creature the more easily to overturn the trees on



Skeleton of the Megatherium.

the foliage of which it browsed. The enormous development of the bones of the pelvis, the hind-legs, and the tail, gave the animal great power when, seated on its hind-legs and tail, as on a tripod, it raised its fore-legs against the trunk, and applied its force against a tree that had already been weakened by having its roots dug up. The structure of the lower jaw seems to indicate that the snout was prolonged and more or less flexible, and it seems probable that the Megatherium was furnished with a prehensile tongue like that of the giraffe, with which it stripped the foliage from the trees. The remains of several allied genera of huge Edentata are associated with the Megatherium in the deposits on the pampas. They form the family Megatheriidæ of Owen, which includes Mylodon, Megalonyx, Scelidotherium, &c.—genera which are separated from Megatherium chiefly from peculiarities in the dentition. The modern sloth is a native of South America, and the fossil remains of these immense creatures, which represented it in the newer Tertiaries, are found only in the American continent.

Meghna, the estuary of the Ganges (q.v.) and Brahmaputra (q.v.). See Map at CALCUTTA.

Megiddo, an ancient city of Palestine, the site of which is somewhat uncertain, in the plain of Esdraelon. In the battle there Josiah (q.v.) was slain in 609 B.C.

Megilp. See MAGILP.

Megrim. See HEADACHE.

Megrims and **Vertigo** are the terms usually applied when a horse at work reels, and then either stands for a minute dull and stupid, or falls to the ground, lying for a time partially insensible. These attacks come on suddenly, are often periodical, and are most frequent during hot weather and when the animal is drawing up a hill, or exposed during heavy work to the full rays of a hot sun. Liability to megrims constitutes unsoundness, and usually depends upon the circulation through the brain being temporarily disturbed by the presence of tumours, or by weakness of the heart's action. Horses subject to megrims are always dangerous; if driven at all, they should be used with a breast-

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plate or pipe-collar, so as to prevent, as much as possible, pressure on the veins carrying the blood from the head; they should be moderately and carefully fed, and during hot weather have an occasional laxative.

Mehemet Ali, better MOHAMMED 'ALI, Viceroy of Egypt (1805–49), was born in Albania in 1769, and was sent to Egypt with a Turkish force in 1799. See EGYPT, Vol. IV. p. 242.

Méhul, ETIENNE NICOLAS, operatic composer, was born at Givet, 22d June 1763, studied in Paris, and in 1795 became professor at the Conservatoire. He died 18th October 1817. Among his best-known works are the operas *Une Folie* (1801), *Les Aveugles de Tolède* (1806), and *Joseph* (1807); and the patriotic songs *Chant du Depart*, *Chant de Victoire*, *Chanson de Roland*. See Life by Pougin (1889).

Meilhac, French playwright, born in 1832 in Paris, was trained as an artist and published his first dramatic work in 1855. He has subsequently produced a long series of light comedies—some in conjunction with Halévy. Some are well known through Offenbach's music. His *chef-d'œuvre* is *Frou-Frou* (1869).

Meinam. See SIAM.

Meiningen, the capital of the German duchy of Saxe-Meiningen, lies in a narrow valley on the banks of the Werra, 43 miles by rail NW. of Coburg. The ducal castle (1682), the most prominent building in the town, contains libraries, a picture-gallery, collection of coins, &c. There is a fine 'English garden' here. The town has been in great part rebuilt since 1874, when a fire destroyed the old streets. It was an appendage of the see of Würzburg from 1008 to 1542, and in 1583 came into the hands of the Saxon ducal family. Pop. (1875) 9521; (1885) 11,448.

The Meiningen Court Company of Actors, under the able management of Duke George of Saxe-Meiningen and the actor Chronegk, gained the highest reputation in Germany (from about 1874) for the historical accuracy and beauty of their scenery, dress, and mounting, and the excellent discipline, balance, and harmony of their acting in its *ensemble*. They appeared at Drury Lane, London, in May and June 1881. The company was dissolved in 1890.

Meissen, a town in the kingdom of Saxony, is situated in a beautiful district on the left bank of the Elbe, 14 miles by rail NW. of Dresden. Its chief building is the cathedral (*c.* 1266–1479), one of the finest Gothic churches in Germany, surmounted by an exquisite spire (263 feet) of open work, and containing many fine brasses. The castle was built in 1471–83, and in 1710 was converted into the porcelain factory over which Böttger presided (see POTTERY). In 1863 the castle was restored, its walls being adorned with frescoes by modern painters, the porcelain factory having been removed in 1860 to other premises; 800 men are employed. Other manufactures are iron, machinery, jute, and cigars. Here is the celebrated school of St Afra, where Gellert and Lessing were educated. It was founded by Duke Maurice in 1543, and until 1879 occupied the former Afra monastery (built in 1205). Meissen was founded in 928 by Henry I. of Germany, as a stronghold against the Slavonians, and was long the capital of the margraviate and burgraviate of Meissen, which was subsequently merged in the duchy of Saxony. The town was burned down by the Swedes under Banér in 1637. Pop. (1875) 13,002; (1885) 15,474.

Meissonier, JEAN LOUIS ERNEST, figure-painter, was born at Lyons, 21st February 1813. When he was still a child his father established himself as a druggist in Paris; and the son, having resolved upon art as a profession, studied under Jules Potier and Léon Cogniet. His drawings were praised by Johannot, and about 1833–34 he was employed by Curmer the publisher on designs for the Royaument Bible and other works. He first made a distinct mark in 1838, by his illustrations to *Paul and Virginia* and the *Chaumière Indienne;* many other volumes were enriched by his pencil, and his career as a book-illustrator closes with his spirited designs to the *Contes Rémois* of the Comte de Chevigné. Meanwhile, he had been steadily practising painting. In 1834 he began to contribute to the Salon with a water-colour and an oil-picture, the latter strongly suggestive of the work of the figure-painters of Holland, who have powerfully influenced Meissonier during his whole career. Two years later he exhibited the first of his various groups of 'Chess-players,' and here his accurate precision of draughtsmanship and quietly dramatic truth of attitude and expression first became clearly visible. It was followed by a long series of elaborate and successful genre-pictures, in which, with the most careful and finished—if sometimes rather hard and unsympathetic—execution, and with the most perfect verisimilitude of costume and local colouring, the artist has depicted the civil and military life of the 17th and 18th centuries, passing—in such works as the 'Napoleon I.,' a small single-figure picture which Mr Ruskin sold in 1882 for £6090; the 'Campaigne de France, 1814' (1864); 'Solferino' (1866), now in the Luxembourg Gallery; 'Cuirassiers or 1805' (1871); and 'Friedland or 1807,' bought by M. Sécrétan in 1878 for 400,000 francs—to subjects of genre or history taken from the 19th century. Among the most celebrated of his other military scenes may be named 'La Rixe' (1854), purchased by Queen Victoria; and not less fascinating are his simpler groups of students, artists, collectors, &c., such as 'La Lecture chez Diderot' (1859), 'Les Amateurs de Peinture' (1860), and 'La Lecture du Manuscrit' (1867). He has also executed some striking portraits, including 'Dumas fils' (1877) and 'M. Victor Lefranc' (1883). Finally, we may refer to his design for the decoration of the Panthéon—'the apotheosis of France'—the cartoons of which were exhibited to the commission in 1889. Many of his pictures have been engraved and otherwise reproduced; and he has himself etched some dozen plates, impressions from most of which are scarce. He became a Commander of the Legion of Honour in 1867, Grand Cross 1889, and a member of the Institute in 1861; and he is an honorary member of the Royal Academy. An exhibition of 146 of his works was brought together at Paris in 1884. See Clarette, *Ernest Meissonier* (Paris, 1881); *Life and Work of Leighton, Alma Tadema, Meissonier*, &c. (1890).

Meistersänger. See GERMANY, Vol. V. p. 187.

Mekhong, the greatest river of the Siam peninsula, is usually identified with the Lan-tsan, which rises in the neighbourhood of Chiamdo in Tibet—its exact sources are not known. It pursues a generally southerly direction to the China Sea, which it enters by several mouths in Cochin-China. This country indeed is formed by its deltaic deposits. The river has a total length of 2800 miles; but is not navigated higher than 14° N. lat. owing to rapids and cliffs which beset its bed in the mountainous regions.

Meklong, a town of Siam, near where the Meklong River runs into the Gulf of Siam. Among its 10,000 inhabitants many are Chinese.

Mela, POMPONIUS, the first Latin writer who composed a strictly geographical work, was born at Tingentera in the south of Spain, and lived in

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the time of the Emperor Claudius; nothing else is known concerning him. His work, an unsystematic compendium, is in three books, and is entitled *De Situ Orbis*. The text is greatly corrupted. The *editio princeps* appeared at Milan in 1471; the best modern edition is that by Parthey (Berlin, 1867).

Melaleuca. See CAJEPUT.

Melancholia. See INSANITY.

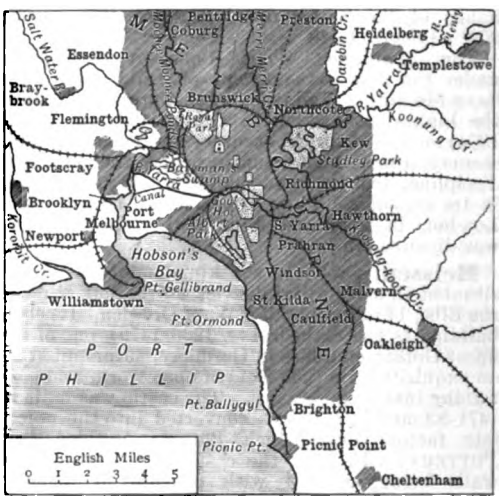
Melanchthon, PHILIP, Luther's fellow-labourer in the Reformation, was born, February 16, 1497, at Bretten, in the Palatinate of the Rhine, now in the grand-duchy of Baden. His name was originally Schwarzerd ('black earth'), of which Melanchthon is a Greek translation. He was educated at the university of Heidelberg, where he took the degree of Bachelor of Philosophy in 1512. In the same year he went to Tübingen, studied theology, took the degree of Doctor, and in 1514 gave lectures on the Aristotelian philosophy and the classics. About this time he published a Greek grammar. On his relative Reuchlin's recommendation he was appointed in 1518 professor of Greek in Wittenberg. Brought into contact with Luther in that town, he at once became his fellow-worker in the great religious revolution with which Luther's name is identified. Melanchthon brought to his aid an extent of learning that made him to be regarded as another Erasmus, and a gift of lucid exposition and purity of Latin style unrivalled among his contemporaries. The natural sweetness of his temper and the habitual moderation of his views also advantageously tempered Luther's vehemence. In 1521 he published his *Loci Communes Rerum Theologicarum*, the first great Protestant work on dogmatic theology. It passed through more than fifty editions in the course of the author's life. In 1530 he made a most important contribution to the cause of Protestantism, in the Augsburg Confession (q.v.). In 1541 he went to Worms, and soon after to Ratisbon, to conduct the cause of the Protestants in the conferences there. But the influence of the papal legate counteracted all his efforts for a peaceful accommodation, and his own party were much dissatisfied on account of the concessions which he made. After Luther's death, Melanchthon lost in some measure the confidence of some of the Protestants by those concessions to the Catholics which his anxiety for peace led him to make; whilst the zealous Lutherans were no less displeased because of his approximation to the doctrine of Calvin on the Lord's Supper. His consent, conditionally given, to the introduction of the Augsburg Interim (q.v.) in Saxony, in 1549, led to painful controversies, which filled the latter years of his life with disquietude. He died at Wittenberg, 19th April 1560. By his calm wisdom and the reputation of his genius, Melanchthon did much to save the Reformation from those excesses that would have made its progress impossible. In the performance of this task he incurred much opposition from Luther himself, and still more from the enthusiasts who came to the front after Luther's death; but the subsequent religious history of Germany is conclusive proof of the wisdom of his action. By his labours as a scholar and public teacher, Melanchthon ranks with the very highest names in the history of learning and education. Alike by his temper and intellectual interests, he is to be regarded as blending in the happiest proportion the humanist and the reformer. The most complete edition of his works (which comprise a Greek and Latin Grammar, editions of and commentaries on several classics and the Septuagint, biblical commentaries, doctrinal and ethical works, official documents, declarations, dissertations, responses, and a very extensive correspondence with friends and the leading men of the age) is that by Bretschneider and Bindseil in their *Corpus Reformatorum* (28 vols. 1834–60). Melanchthon's Life has been written by his friend Camerarius (1566). See also Lives by Cox, Matthes (Altenb. 1841), Nitzsch, Schmidt (Elberf. 1861), Meurer (2d ed. Leip. 1869), Schaff (Lond. 1887), and Hartfelder (Berlin, 1889).

Melanesia (Gr. *melas*, 'black') is a name given to those Pacific islands near New Guinea which are inhabited by the Papuan race. See POLYNESIA.

Melaphyre. See BASALT.

Melbourn, in Derbyshire, 7 miles SE. of Derby by rail; pop. 3123. It is noted for its market-gardens, and has some manufactures. Melbourn Hall, formerly seat of Lord Melbourne, belongs to Earl Cowper.

Melbourne, the metropolis of the Australian colony of Victoria, and the most important city of Australasia, stands at the northern extremity of Port Phillip Bay, and is bisected by the river Yarra; it is in 37° 49′ S. lat. and 144° 58′ E. long. To facilitate navigation and enable large vessels to discharge their cargoes almost at the doors of the warehouses, a canal was cut from a point near the mouth of the river to the Melbourne quays and opened in 1888. Williamstown and Port Melbourne, built on the shores of the bay, give extensive pier accommodation, and are thriving ports. Melbourne is a chessboard city, built on strict mathematical lines, its streets intersecting at right angles, the principal thoroughfares being of considerably greater width (99 feet) than is necessary or desirable in such a warm climate.



Collins Street is architecturally imposing, being lined on either side by tall, massive, and ornate buildings, chiefly banks, offices, warehouses, and hotels. Bourke Street corresponds to the London Strand; but it is three times as wide and four times as long. Here most of the theatres, music-halls, and retail shops are situated. An extensive system of cable tramway locomotion was inaugurated in 1886.

Melbourne has a flourishing university, founded in 1853 largely through the instrumentality of Mr Childers, its first vice-chancellor. There are three affiliated colleges in its immediate vicinity—Trinity (Episcopalian), Queen's (Wesleyan), and Ormond (Presbyterian). The last—one of the finest educational structures in the southern hemisphere—was built at the expense of the Hon.

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Francis Ormond, to whom Melbourne is indebted also for its working-men's college, which is doing noble work in technical education, and its endowed chair of music in the university. The Wilson Hall, the gift of Sir Samuel Wilson, M.P., is also a noteworthy adjunct of the university. The Exhibition building in the Carlton Gardens and the General Post-office are two of the most conspicuous and ornamental of Melbourne's public buildings. The Houses of Parliament, completed in 1891, have cost nearly a million of money. They form a magnificent pile of buildings, the western façade being particularly striking and effective. The Trades Hall, a quadrangular structure founded in 1857, stands on the northern boundary of the city proper. Melbourne possesses an excellent and well-appointed public library of about 200,000 vols., and associated with it on the same reserve are a national art gallery and a technological museum. The three institutions are governed by a body of trustees, and are supported by a large state endowment. The town-hall has an immense assembly-room, largely used for concerts and public meetings, and also an organ of fine tone and colossal size. Crowning the summit of the western hill of Melbourne are the new law-courts, forming an extensive square, and topped by a lofty and graceful dome. Close by is the Melbourne branch of the Royal Mint, established in 1872. Other notable public institutions are the Melbourne and Alfred hospitals, the Benevolent Asylum, the Immigrants' Home, the Orphan Asylums, the Custom-house, the Treasury, and the Public Offices, the last-named being a vast and labyrinthine pile in which most of the government departments are housed. St Patrick's Roman Catholic cathedral, close to the Houses of Parliament, is a towering Gothic structure and the most conspicuous ecclesiastical edifice in Melbourne. The Anglican cathedral of St Paul suffers in appearance by its depressed site and by the fact that it is hemmed in by clustering warehouses. The Scots Church is the architectural gem of Collins Street. Its soaring spire, of more than 200 feet, is peculiarly graceful and harmonious in design.

Melbourne supports three morning and two evening journals, besides a host of weeklies and monthlies. Railways have been pushed on with energy in Victoria (whose railway-system connects with those of South Australia, New South Wales, and Queensland), and, as Melbourne is the converging point of all the systems, the western end of the city, where the railway department is quartered and the central station has been built, is a scene of incessant activity. Melbourne has grown with remarkable rapidity. In 1841 its population was 11,000; in 1851, the year of the gold discoveries, it was less than 25,000; in 1861, 191,000; in 1871, with suburbs, 206,780; in 1881, 282,907 (of whom 65,800 were in 'the city'). According to the official estimates, it had in 1890 a population of 450,000, there having been of late years a large influx from the country districts and from the other colonies. This estimate includes all the suburbs within a radius of 10 miles from the General Post-office. Protection to native industry is the fiscal policy of the colony, and Melbourne has developed into a considerable centre of manufacturing enterprise. Foundries, flour-mills, boot and clothing factories, &c. are numerous in the suburbs. The Royal Park, the Carlton, Fitzroy, Botanical, and Flagstaff Gardens are the principal popular recreation reserves. The water-supply of Melbourne, which is abundant, comes from the Yan-Yean reservoir in the Plenty Valley, and had cost up till 1876 about 1½ million sterling. The sanitary condition of Melbourne is not so good as might have been expected from the general mildness of its climate and the high average of prosperity of the inhabitants. Typhoid fever notably has been excessively prevalent, and of late years there has been increase rather than the steady diminution which has been the rule in the cities and towns of Europe and America. It is recognised that this is mainly due to defective drainage, and an unsatisfactory method of night soil disposal. An eminent London engineer reported in 1890 on the subject, suggesting a scheme for a complete system of underground drainage at a cost of over £5,000,000.

Port Phillip Bay, the maritime approach to Melbourne, is a spacious land-locked inlet of the South Pacific covering 800 sq. m., and mostly available for anchorage. The entrance, known as 'The Heads,' is very narrow, and strong fortifications were begun by the Victorian government in 1875. A well-equipped pilot station is maintained here.

Melbourne was first occupied by white men in 1835, and the infant settlement was originally known as Doutta-Galla, that being the name of the tribe of blacks who inhabited the neighbourhood. In 1837 it was christened after the reigning premier, Lord Melbourne, in 1842 it was incorporated, and in 1851 it was advanced to the dignity of a capital when the Port Phillip province was separated from New South Wales and erected into the autonomous colony of Victoria. Simultaneously with this latter event the Victorian goldfields were opened up, and the history of Melbourne ever since has been one of marvellous strides in material progress and prosperity. By way of celebrating the centenary of the colonisation of Australia, an International Exhibition was held in Melbourne during the later half of 1888. It cost the colony a quarter of a million. A great conflict between labour and capital took place in 1890, and a strike by the labour-unionists took place on a very extensive scale both in Victoria and New South Wales. The imports of Melbourne during 1888 were valued at £19,145,159; and the exports, in which wool and gold bulk most largely, at £12,521,980. See *Victoria and its Metropolis, Past and Present* (Melbourne, 2 vols. 1889).

Melbourne, WILLIAM LAMB, VISCOUNT, statesman, was second son of Penistone Lamb, first Viscount Melbourne, and was born in London, 15th March 1779. His education he received at Eton, at Trinity College, Cambridge, and at Glasgow. He entered the House of Commons for Leominster in 1805 as a Whig, a follower of Charles James Fox. But, having become a convert to Canning's views, he accepted in 1827 the chief-secretaryship of Ireland in his government, and continued to hold the post under Lord Goderich and the Duke of Wellington. In 1828 the death of his father transferred him to the Upper House. Returning to his allegiance to the Whigs, in 1830 he took the seals of the Home Office in the government of Earl Grey, and in July 1834 succeeded his chief as prime-minister, but only remained at the head of affairs until the following November. Peel, however, gave way to Melbourne again in 1835; and he continued in office when Victoria ascended the throne (1837). He succeeded by his uncommon tact in introducing her pleasantly to the various duties of a constitutional monarch. In 1841 he once more passed the seals of office to Sir Robert Peel, and thenceforward took little part in public affairs. He was ineffective as a speaker, but displayed aptitude for affairs and common sense in the ordering of them. His easy cheerful temper and cordial frankness of manner gained him many friends. Sydney Smith, in his second letter to Archdeacon Singleton, has described his character with an

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exquisite mixture of sarcasm and compliment. Melbourne died November 24, 1848. He married (1805) a daughter of the Earl of Bessborough, who, under the title of Lady Caroline Lamb (1785–1828), attained some celebrity as a novel-writer, besides notoriety from her relations with Lord Byron. The charge brought against him by the husband in 1836 of seducing the famous Mrs Norton was thrown out by the jury without leaving the box.

See *Memoirs* by Torrens (2 vols. 1878); *Lord Melbourne's Papers*, edited by L. C. Sanders (1889); *The Greville Memoirs* (parts i. and ii. 1875–85); and Life by Dunckley (1890).

Melchites, the name given to a body of Christians in Syria, Palestine, and Egypt, who acknowledge the authority of the pope, and accept the doctrines of the Church of Rome, but use the liturgy and ceremonies of the Greek Church. They conduct divine service in the vernacular tongue, receive the Lord's Supper in both kinds, and follow the Eastern Calendar. Their priests need not be celibate, but must not marry after ordination. They number close upon 80,000, and are ruled by a patriarch at Damascus, and twelve bishops. The name Melchites (lit. Royalists, from Syriac *melcha*, 'a king') dates from the 5th century, and was given to those members of the orthodox Eastern Church who supported the emperors against the Monophysites (q.v.) and Nestorians (q.v.).

Melchizedek ('king of righteousness'), in the story of Genesis, king of Salem and priest of 'Supreme El.' He met Abram on his return from the victorious expedition against Chedorlaomer, gave him his blessing, and received tithes from him. The ante-legal king-priest stands in Psalm cx. as a figure typical of the vicegerent of Jehovah, and in Hebrews, vii. 3, of the kingly priesthood of Jesus. The chapter in Genesis containing his story stands alone in character in the Pentateuch, and according to Wellhausen is one of its latest additions. Some count it the earliest portion of ancient secular history, as Ewald, who thinks it may be based on old Canaanitish records; others, as Nöldeke, explain it as utterly unhistorical.

Melcombe Regis. See WEYMOUTH.

Melegnano, formerly MARIGNANO, a town of Northern Italy, by rail 12 miles SE. of Milan. Pop. 5438. Here Francis I. of France defeated the Swiss in 1515; and in June 1859 a French force under Baraguay d'Hilliers routed the Austrian rearguard under Benedek.

Melfi, an ancient episcopal town of Southern Italy, 30 miles N. of Potenza. It is situated on a bed of lava to the north-east of the volcanic Monte Volture. The once magnificent cathedral, erected in 1155, was almost entirely destroyed by an earthquake in 1851. Melfi was a great stronghold of the Normans and capital of Apulia. Pop. 11,765.

Melford, LONG, a picturesque village of Suffolk, 13 miles S. of Bury St Edmunds by rail. It has a very fine Perpendicular church 260 feet long. Pop. of parish, 3293. See two works by Sir W. Parker and E. L. Conder (1888).

Melilot (*Melilotus*), a genus of clover-like plants of the natural order Leguminosæ. The Common Melilot, a yellow-flowered annual, pretty common in hedgerows and the borders of fields in Britain, has when in flower the peculiar sweet odour of *Tonka Bean*. The odour increases in drying. The flowers and seeds are the chief ingredients in flavouring Gruyère cheese, being bruised and mixed with the curd before it is pressed.—The Blue Melilot (*M. cærulea*), a native of the north of Africa, with short racemes of blue flowers, is cultivated in many parts of Europe, particularly in Switzerland and the Tyrol, and has the peculiar melilot odour in a high degree. The name Bokhara Clover has been given to one or more species.

Melinite, an explosive obtained from Picric Acid (q.v.), itself a powerful explosive, by the admixture of some other substance. The fabulous powers attributed to melinite when introduced for artillery purposes (for shells) by General Boulanger in 1886 have not been realised; the substance has been found not stable or reliable, and has caused some bad accidents.

Meliphagidæ. See HONEY-EATER.

Melissic Acid. See WAX.

Mellifont Abbey, a ruin standing 4 miles NW. of Drogheda, was the first Cistercian foundation in Ireland, founded by St Malachy (q.v.) in 1142. In 1539, when it surrendered to Henry VIII.'s commissioners, it had 140 monks. Its remains were excavated during 1884–85. See *Mellifont Abbey*, by K. F. B. (1886).

Melo, a town of Cerro Largo in Uruguay, on the Tacuari, here crossed by a stone bridge, 'built in 1865 by a Frenchman who was murdered for collecting toll' (Mulhall). Pop. 5000.

Melodeon, an instrument of the type of the Harmonium (q.v.), superseded by the American organ. In 1859 over 20,000 melodeons were made in the United States. The name is also applied to an improved variety of the Accordion (q.v.).

Melodrama (Gr. *melos*, 'a song,' and *drama*) strictly denotes a half-musical drama, or that kind of dramatic performance in which declamation is interrupted from time to time by instrumental music. The name, however, which was first applied to the *opera* by its inventor, Ottavio Rinuccini, has come to designate a romantic play, depending mainly on sensational incidents, thrilling situations, and an effective dénouement. Great sums are spent in the staging of such pieces, and the costumes, scenery, and mechanical effects are often very striking. The expression 'transpontine drama' refers to a time when such plays were identified with houses on the Surrey side of the Thames; nowadays the home of melodrama in London is to be found in such theatres as Drury Lane and the Adelphi.

Melon (*Cucumis melo*), a plant of the same genus with the Cucumber (q.v.), much cultivated for its fruit, which is sweet, with a delicious though peculiar flavour and smell. The melon is an annual, with trailing or climbing stems, lateral tendrils, rounded angular leaves, small, yellow, monœcious flowers, and large round or somewhat ovate fruit. It is supposed to be a native of the subtropical parts of Asia, although it has never been discovered in a wild state. Its English name was originally *Musk Melon*. The varieties in cultivation are very numerous, some of them distinguished by a thick and warty rind, some by a rind cracked in a net-like manner, some by ribs and furrows, some by a perfectly smooth and thin rind; they differ also in the colour of the *flesh* of the fruit, which is green, red, yellow, &c.; and in the size of the fruit, which varies from 3 or 4 inches to a foot or more in diameter. The melon is eaten either by itself or with sugar, and sometimes with pepper or ginger. Its cultivation in hotbeds and in specially constructed hothouses is extensively carried on in all parts of Britain, and very great care is bestowed on it. A loamy soil is best suited to it. The *setting* of the fruit by dusting the female flower with the pollen of the male flower is constantly practised by gardeners. Warmth and bright sunshine are requisite to the production of fruit of good quality.—The Water Melon or Citrul (*C. citrullus*), although rarely

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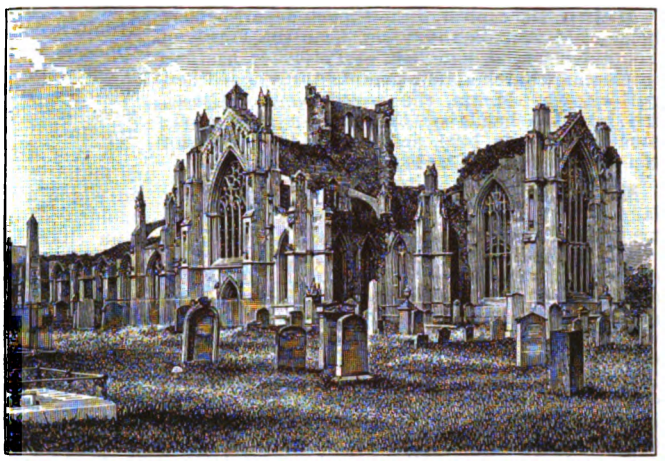
cultivated in Britain, is highly esteemed and much cultivated in almost all warm countries. It is a native of the warm parts of the Old World. It has deeply lobed and gashed leaves, and a large round fruit with smooth dark-green spotted rind, and pink or white flesh, less sweet than the melon, but much more juicy or watery, and therefore much prized in many warm countries. In America it is only the water melon that is ever called simply melon; for the other the old English name is retained where 'cantaloupe' is not used. In South Carolina the water melon has reached 45 lb.—South Africa has another species of Water Melon (*C. Caffer*), very valuable to the inhabitants.—The Chate (*C. Chate*) is a native of Egypt and Arabia.—The Kaukoor (*C. utilissimus*) is a native of India, and much cultivated in some parts of that country; it has oval fruit, smooth, variegated with different shades of yellow, and about 6 inches long, with much the flavour of the melon. The fruit will keep for several months, and is much used both raw and in curries. The half-grown fruit is pickled. The seeds contain much farina and oil, and are ground into meal; the oil is also expressed, and used both for food and in lamps. The seeds of others of this genus may be used in the same way; and they are said to be useful as a diuretic medicine.

Melos (Ital. *Milo*), a Greek island, the most south-westerly of the Cyclades, 13 miles long by 8 broad, with 4200 inhabitants. The island is volcanic, and produces sulphur, salt, pumice-stone, stucco, millstones, and a little oil and wine. Amongst the ruins of the ancient city of Melos, and near its theatre, was found the priceless antique, the Venus de Milo, now one of the chiefest treasures of the Louvre. See VENUS.

Melpom'ene ('the singing one'), one of the nine Muses, the representative of Tragedy.

Melrose, a pleasant little town of Roxburghshire, on the south bank of the Tweed, and at the north base of the triple Eildons (q.v.), 37 miles SSE. of Edinburgh by rail. At Old Melrose, 2½ miles farther east, was founded about 635 the Columban monastery, of which St Cuthbert (q.v.) became a monk. It was burned by Kenneth MacAlpine in 839, and had been quite deserted for upwards of fifty years, when in 1136 the great Cistercian abbey of Melrose itself was founded by David I. Twice burned by the English, this was slowly rebuilt on a scale of increased magnificence between 1322 and 1505, only forty years after which date two fresh English invasions commenced the destruction that was speedily completed by the Reformers. The abbey was in the Second Pointed style, with approaches to Third Pointed, and was beyond doubt the most beautiful structure of which Scotland could boast in the middle ages. What now remains is the ruined conventual church, 215 feet long by 116 across the transepts, with some fragments of the cloister, which seems to have been a square of 150 feet. The carvings and traceries, hewn in a stone of singular excellence, are scarcely surpassed by any in England. Melrose shines in Scott's pages with a splendour its meagre history fails to sustain. The second abbot, St Waltheof, the royal founder's stepson; Alexander II. and Johanna, his queen; the heart of Robert Bruce; the good Sir James, the Knight of Liddesdale, the hero of Otterburn, and others of the Douglas line; the 'wondrous Michael Scott;' and Sir David Brewster—all these are buried here; else, the annals of Melrose have little to record. A burgh of barony since 1609, the town possesses a market-cross (1642), a suspension foot-bridge over the Tweed (1826), a hydropathic (1871), and half a dozen hotels, it being a great tourist centre, as well for its abbey as from the vicinity of Abbotsford, Dryburgh, &c. Pop. (1841) 893; (1881) 1550.



Melrose Abbey.

See the *Chronica de Mailros, 731–1275*, ed. by Joseph Stevenson (Bannatyne Club, 1835); the *Liber S. Marie de Melros*, ed. by Cosmo Innes (Bannatyne Club, 1837); Scott's *Abbot* and *Lay of the Last Minstrel;* and works by Wade (1861) and Pinches (1879).

Melting-point. The following are some of the most important melting-points, which may also be regarded as the freezing-points of the corresponding liquids:

	Cent.	Fah.
	°	°
Alcohol, pure	−130	−202
Hydrobromic acid	−120	−184
Strongest sulphuric acid	−116	−177
Sulphuretted hydrogen	− 85	−121
Ammonia	− 75	−103
Sulphurous acid	− 75	−103
Chlorine	− 75	−103
Carbonic ac.	− 70	− 94
Chloroform	− 70	− 94
Mercury	− 39·38	− 38·88
Olive and linseed oil	− 20	− 4
Bromine	− 7·3	+ 19·86
Ice	0	32
Glacial acetic acid	17	62·6
Phosphorus	44·2	111
Potassium	62·5	144·5
Sodium	96·6	204
Iodine	113	235

	Cent.	Fah.
	°	°
Sulphur	115	239
Lithium	180	356
Solder...about	180	356
Tin	228	442
Bismuth	267	513
Lead	334	633
Antimony	430	806
Zinc	450	842
Magnesium ...about	750	1382
Bronze	900	1652
Silver	1000	1832
Brass	1015	1860
Copper	1100	2012
Iron, white cast	1100	2012
Iron, gray cast	1225	2237
Gold, pure	1250	2282
Steel	1350	2462
Soft iron	1550	2822
Manganese	1600	2912
Platinum	1800	3272
Iridium	1950	3542
Osmium	2500	4532

Melting-points beyond about 900° or 1000° F. are merely approximate and relative.

Melton-Mowbray, a town of Leicestershire, in the centre of a great hunting district, is seated on the river Eye near its junction with the Wreak, 15 miles NE. of Leicester, and 104 NNW. of London. It has a fine cruciform church, mainly Early English, and is famous for its manufactures of pork pies and Stilton cheese, chiefly for retail in the London, Manchester, and Leeds markets. Near the town in February 1644 a severe engagement took place between parties of royalist

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and parliamentary troops, resulting in the defeat of the latter; and amongst its natives have been Archbishop de Melton, who lies buried in the church, and 'Orator' Henley. Pop. (1801) 1766; (1881) 5820.

Melun, the capital of the French department of Seine-et-Marne, on the Seine, near the Forest of Fontainebleau, 28 miles SE. of Paris. It has two interesting churches, and manufactures of leather, pottery, &c. Melun, the *Melodunum* of Cæsar, fell into the hands of the English after a six months' siege, in 1420, and was held by them for ten years. Pop. (1872) 11,098; (1886) 12,527.

Melusine, or MELUSINA, the name of a fairy lady who figures prominently in the celebrated medieval French romance so called, the *motif* of which is similar to that of the legend of Eros (Cupid) and Psyche, is of far-reaching antiquity, and has many parallels and analogues in the legends and popular fictions of most countries, Asiatic as well as European. Briefly stated, Melusine consents to marry a knight called Raymondin, or Raymond, on the condition that he should never see her on a certain day every week, to which he binds himself by solemn oaths. She bears him eight sons, the warlike exploits of seven of whom occupy the greater portion of this entertaining romance. At length Raymond is induced by his brother to break his promise, and on the usual day of Melusine's seclusion he discovers her in a bath, the lower part of her body being like a great serpent. Soon after this Raymond, enraged at the cruelty of one of his sons, upbraids the innocent Melusine as 'a false serpent,' whose offspring could never come to any permanent good. Melusine forgives him, but her doom cannot be averted, and, after a touching scene, she takes her flight through the window in the likeness of a monstrous dragon; and in this form she afterwards appeared hovering near the castle of Lusignan—erected by her own fairy power for her beloved lord Raymond—whenever one of her descendants was about to die, thus acting the part of the Irish *Banshee*.

In the myth of Cupid and Psyche the mortal maiden is not to behold her celestial spouse; but, incited by her envious sisters, she takes a lighted lamp to look upon him one night as he lies asleep, and, in her agitation at beholding his marvellous beauty, a drop of oil from the lamp falls on him, whereupon he and the splendid palace vanish, and Psyche finds herself on a desolate heath. She is reunited to him, however, after performing a number of seemingly impossible tasks by order of her vindictive mother-in-law, Venus. This myth has deeply penetrated European folklore. In a Sicilian tale a girl is married to a green bird, who changes to a handsome young man on bathing in a pan of milk. She is not to ask his name. In a Norse tale a prince is bewitched by his stepmother, so that he is a white bear by day and a man by night; in a Danish tale, a wolf; in a Chilian tale (of European origin doubtless), a hideous black man; and in all three, and many other analogues and variants, the bride loses her enchanted spouse for a time in the same manner as in the Græco-Roman myth, which several learned scholars have endeavoured to interpret as typifying the natural phenomenon of the Dawn.

One of the oldest legends of this class is the Hindu myth of Urvasí and Purúravas, the condition which the celestial nymph imposes on her husband being that she is not to see him naked—which Mr Andrew Lang (*Custom and Myth*) considers, with good reason, as signifying 'a custom of women.' Pressine, the mother of Melusine, imposes on her husband, the king of Albany, the condition that he should never see her in childbed. He forgets his promise and loses his fairy spouse. According to a Spanish legend of the princely family of Haro, a lord of Biscay, while chasing the wild boar, meets with a fairy, who consents to wed him if he promise never to pronounce a holy name in her presence.—In another Hindu legend, Bhekí, the frog, is a maiden who consents to marry a king on the condition that he never shows her a drop of water: being faint one day, she asked her husband for water, which he gave her, forgetting his promise, and she disappeared.

A very striking parallel to the legend of Melusine is found in a tale current among the Esthonians, in which a wandering youth falls in love with a maiden sitting on a rock by the shore, who takes him (like Undine with the knight in Fouqué's charming tale) down into a submarine palace, where she marries him, but imposes on him one condition, that he must not seek to see her on a Thursday. His curiosity at length overpowers his prudence, and he discovers her in a great tank of water, with the lower part of her body like that of a fish, the result being that he finds himself near his native village, where nobody knows him, for he is now an old man, and all his relatives are dead. Undine is also a daughter of the stream, and she makes her husband promise that he will never speak angrily to her when on or near any water. So, too, in the Persian tale of King Ruzvanshah and the Turkish tale of the king of Yemen, both of whom espouse daughters of the genii; the condition is that the husband must not question or complain of anything his wife should do, however strange it might appear. Such conditions occur so frequently in the fairy tales of almost every people (see also LOHENGRIN); and it may be added that tales of Forbidden Chambers, familiar to readers of the *Arabian Nights*, of which many examples are current in Europe, are closely allied to legends of the Urvasí and Purúravas, Eros and Psyche, and Melusina cycle.

See Max-Müller's *Chips from a German Workshop*, vol. ii.; Baring-Gould's *Curious Myths of the Middle Ages;* Cox's *Mythology of the Aryan Nations* (1870); Grimm's *Teutonic Mythology* (trans. Stalybrass); Clouston's *Popular Tales and Fictions* (1887); Clouston's *Group of Eastern Romances and Stories* (1889); and the old English version of the romance of *Melusine*, from the French of John of Arras (1387), printed for the Early English Text Society (1891), from a unique MS. of the 15th century, with full appendix notes by the present writer on the Cupid and Psyche and Melusina cycle of legends.

Melville, the name of an island, a sound, and a peninsula in the polar regions of North America. The *island* is crossed by 75° N. lat. and 110° W. long., and is separated on the west by Fitzwilliam Strait from Prince Patrick Island. Greatest length, 200 miles; greatest breadth, 130 miles. In 1819 Parry, who gave the island its name, passed the winter here with his crews. The *sound*, about 250 miles long by 200 broad, extends south-east of the island, and communicates with the Arctic Ocean on the west by Banks Strait, and with Baffin Bay on the east by Barrow Strait and Lancaster Sound. The *peninsula* projects from the continent at its north-eastern corner, and has on the N. the Fury and Hecla Strait, and on the E. Fox Channel. It is 250 miles in length by about 100 in average breadth.—Another Melville Island lies across the entrance to Van Diemen Gulf off the shore of the northern territory of South Australia. Area, 143 sq. m. It is hilly and covered with vegetation. The earliest British settlement on this coast was made here in 1824.

Melville, ANDREW, a champion of Scottish Presbyterianism, was born 1st August 1545, at

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Baldovy, near Montrose. He was educated at the grammar-school of Montrose, whence he removed in his fourteenth year to the university of St Andrews. Here he remained four years, and left it with the reputation of being 'the best philosopher, poet, and Grecian of any young master in the land.' He then proceeded to Paris, where he continued his studies for two years. His reputation must have been already considerable, for in his twenty-first year he was chosen regent in the college of St Marceon, Poitiers. Some time afterwards he proceeded to Geneva, where through the influence of Beza, with whose opinions in religion and politics he already sympathised, he was appointed to the chair of Humanity in the Academy. On his return to Scotland (1574) he was appointed Principal of the college of Glasgow, where he did the highest service to the cause of learning throughout the country. He had a very important share in drawing up that charter of the Presbyterian polity, the Second Book of Discipline (see DISCIPLINE). In 1580 Melville was chosen Principal of St Mary's College, St Andrews. Here, 'besides giving lectures on theology, he taught the Hebrew, Chaldee, Syriac, and Rabbinical languages.' In 1582 he preached the opening sermon before the General Assembly, and boldly 'inveighed against the bloody knife of absolute authority, whereby men intended to pull the crown off Christ's head and to wring the sceptre out of his hand.' Two years later Melville was summoned before the Privy-council on account of a sermon preached at St Andrews; and to escape imprisonment he removed to London. Here he remained till the downfall of Arran in the following year, and then after an absence of twenty months returned and resumed his office at St Andrews. He was repeatedly elected moderator of the General Assembly and rector of the university. At Cupar in 1596 Melville headed a deputation to 'remonstrate' with the king; and when James reminded the zealous remonstrant that he was *his* vassal, 'Sirrah!' retorted Melville, 'ye are *God's* silly vassal; there are two kings and two kingdoms in Scotland: there is King James, the head of this commonwealth, and there is Christ Jesus, the King of the church, whose subject James the Sixth is, and of whose kingdom he is not a king, nor a lord, nor a head, but a member.' In 1605 Melville was called to England to attend the famous conference at Hampton Court. Having ridiculed the service in the Chapel Royal in a Latin epigram, he was summoned before the English Privy-council, when he broke out into a torrent of invective against the Archbishop of Canterbury for encouraging popery and superstition, profaning the Sabbath, &c. The king, violating every principle of justice, immediately sent him to the Tower, where he remained for more than four years. In 1611 he was released on the solicitation of the Duke of Bouillon, who wanted his services as a professor in his university at Sedan in France. Melville, now in his sixty-sixth year, would fain have returned to Scotland, but James would not listen to his request. Melville died about 1622, but neither the date of his death nor the events of his last years are ascertained. See M'Crie's *Life of Melville* (2 vols. 1819).

JAMES MELVILLE, nephew of Andrew Melville, was born near Montrose in 1556. After receiving the best education that Scotland could then offer, he became regent or tutor in the college of Glasgow, and afterwards professor of Oriental Languages in the university of St Andrews. In 1586 he settled as minister in Kilrenny, Fife, taking an active though not a commanding part in the affairs of the church at large. He is mainly remembered, however, for his so-called *Diary*, extending from 1556 to 1601. Ejected in 1606, he died in 1614 at Berwick-on-Tweed. Melville sees all the persons and events of his day from his own point of view as a Presbyterian minister. Nevertheless his record is of real interest and importance for students of the period which it covers. There are editions in the Bannatyne Club (1829) and Wodrow Society (1842).

Melville, HERMAN, an American author, was born in New York city, August 1, 1819. He became a sailor, but in 1842 he deserted from a whaling-ship, owing to the captain's harsh treatment, at the Marquesas Islands. There he was kept four months as the prisoner of a savage tribe in the Typee Valley, whence he was rescued by an Australian whaler. Returning to the United States in 1846, he published *Typee*, a spirited account of his residence in the Marquesas, and in 1847 *Omoo*, a continuation of his adventures in Oceania. A number of tales and three volumes of poetry afterwards came from his pen.

Melville, SIR JAMES, of Halhill, born in 1535, was sent as page of honour to the young Queen Mary in France, and subsequently undertook numerous missions to the court of England and of the Elector Palatine. He died 1st November 1607, leaving interesting Memoirs, of which the standard edition is that of the Bannatyne Club (1827).

Melville, VISCOUNT. See DUNDAS.

Melville, WHYTE-. See WHYTE-MELVILLE.

Membrane, in Anatomy. This term is applied to designate those textures of the animal body which are arranged in the form of laminæ, and cover organs, or line the interior of cavities, or take part in the formation of the walls of canals or tubes. The structure and special uses of some of the most important of the animal membranes are noticed in separate articles, such as Mucous Membrane (see DIGESTION), Serous Membrane (q.v.), &c.; and the membranes in which the fœtus is enclosed are described in the article Placenta.

Memel, a Prussian seaport, defended by a citadel and two forts on the sea side, lies at the northern extremity of the Kurisches Haff, at its opening into the Baltic, 70 miles NNE. of Danzig. It has a large harbour, and exports from Lithuania and Russia timber, flax and linseed, coal, manure, grain, and herrings to the annual value of £900,000 to £1,000,000, timber constituting half the value; Great Britain takes one-third of the total. The imports, which generally exceed a million sterling, include the exports in transit, and textiles, colonial produce, and wine and spirits for local use. The town possesses manufactories of brandy, soap and chemicals, saw-mills, iron-foundries, breweries, and shipbuilding-yards. There is a good school of navigation. Pop. (1875) 19,796; (1885) 18,748. Memel was founded in 1252 by the Livonian order, who gave it to the Teutonic Knights, by whom it was fortified in 1404. It suffered severely in the Lithuanian wars (13th to 15th centuries). Here in 1807 Frederick-William III. of Prussia took refuge, and a treaty with England was signed. Having been almost wholly destroyed by fire in 1854, it was rebuilt in modern style. For the river Memel, see NIEMEN.

Memling, or more correctly MEMLINC, HANS, Flemish painter, was born at Mainz in the first half of the 15th century, of Dutch parents, and died at Bruges, where most of his life was spent, on 11th August 1494. His painting gained him a wide reputation, extending even to England and Italy. His principal works are sacred subjects, such as 'The Last Judgment' (at Danzig), 'Seven Sorrows and Seven Joys of the Virgin,' 'Marriage of St Catharine,' 'Adoration,' several Madonnas, and the fourteen small paintings that adorn the shrine containing St Ursula's relics at Cologne; and portraits, as of Sir John Donne, of Burgo-

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master Moreel, and of Moreel's daughter. See Lives by Weale (in Dutch, 1871) and Michiels (in French, 1883); also *Art Journal* (1885, p. 318).

Memmingen, an old town of Bavaria, 33 miles SSE. of Ulm, played a prominent part in the religious wars of the 16th century. Here Moreau defeated the Austrians under Kray, 9th and 10th May 1800. Linen, cloth, &c. are manufactured. Pop. 8688.

Memnon, a hero of Greek mythology, son of Tithonus and Eōs (the Dawn), who led to Troy a host of Ethiopians to aid his step-uncle Priam after the death of Hector, slew Antilochus, Nestor's son, in single combat, and was himself slain by Achilles. Various legends are told of his supposed rule at Susa, where he was said to have built the acropolis, and of his vassalage to the Assyrian Teutamus. His corpse was removed from the battlefield by Eōs, whose early tears for her son are by mortals called dewdrops, and his followers the Memnonides were turned into birds. Memnon is chiefly a post-Homeric hero, and attained his greatest celebrity in very late times, when the Greeks discovered the two famous colossal statues of Amenoph III. standing in front of his now vanished temple on the left bank of the Nile at Thebes, and regardless of history dubbed the eastern one Memnon. It is an imposing throned figure, originally about 60 feet high, carved in breccia, but broken in ancient times and repaired with sandstone blocks. Its special peculiarity, which procured it the name of the 'Vocal Memnon' and the honour of forming one of the seven wonders of the world, was the property of emitting a metallic sound, like the snapping of a chord, especially about sunrise, whence the imaginative Greeks concluded that it was the voice of Memnon hailing his newly-risen mother the Dawn. Considerable difference of opinion has prevailed as to the real cause of this phenomenon, which has been variously ascribed to the artifice of the priests, who struck the sonorous stone of which the statue is composed, to the passage of light draughts of air through the cracks, and to the sudden expansion of aqueous particles under the influence of the sun's rays. This remarkable quality of the statue is first mentioned by Strabo, who visited it in company of Ælius Gallus about 18 B.C.; and upwards of a hundred inscriptions of Greek and Roman visitors incised upon its legs record the visits of ancient travellers to hearken to Memnon when he

> Softly sings beneath the Libyan hills,
> Where spreading Nile parts hundred-gated Thebes,

from the ninth year of Nero, 63 A.D., to the reign of the Emperor Severus, when it became silent. Amongst visitors whose names are recorded are the Emperor Hadrian and his wife Sabina. Septimius Severus also visited the statue, and is believed to have restored it in its present shape; for Juvenal mentions it as broken in half (*dimidio magicæ resonant ubi Memnone chordæ*), and no notice of it occurs under the Pharaohs or Ptolemies (see *Edinburgh Review*, July 1886).—The name of Memnoneum was given to the sepulchral quarter of Thebes, and there were Memnonea at Abydos.—Besides the mythical Memnon two historical personages of this name are known—one a Rhodian commander of the mercenaries of Artabazus in the war against Artaxerxes-Ochus, who subsequently fled to Macedon, and afterwards entering the Persian service defended Persia against Alexander (336 B.C.), and finally died at the siege of Mitylene (333 B.C.): the other a Greek historian, who wrote a history of Heracleia Pontica in 16 books, which have been epitomised by Photius.

Memoirs. See BIOGRAPHY.

Memory. See MNEMONICS.

Memory, DISEASES OF. Memory, or the power of reproducing mental or sensory impressions, is impaired by age, wounds, or injuries to the head or nervous system, fevers, intemperance, and various physical conditions. It is affected in most kinds of mental derangement, but is in a most signal manner obliterated or enfeebled in *Dementia*. There are, however, examples of memory surviving all other faculties, and preserving a clear and extensive notion of long and complicated series of events amid general darkness and ruin of mind. Incoherence owes some of its features to defective or irregular memory. Cases of so marvellous an exaltation of this faculty as where a whole parliamentary debate could be recalled, or a whole play of Shakespeare's recited by a man at one time, which would be ordinarily impossible for him, are common in the beginning of attacks of mania, and always should suggest disease. There are, however, special affections of the faculty. It may be suspended while the intelligence remains intact. Periods of personal or general history may elude the grasp, and even that continuity of impressions which goes far to constitute the feeling of personal identity is broken up, and a duality or multiplicity of experiences may appear to be conjoined. The converse of this may happen, and impressions that had completely faded away may, under excitement or cerebral disease, return. There are, besides, states in which this power is partially affected, as in the instances where the numbers 5 and 7 were lost, and where a highly-educated man could not retain any conception of the letter F; secondly, where it is perverted, recalling images inappropriately and in an erroneous sequence of order or time, and different from what are desired; and thirdly, where, while the written or printed signs of ideas can be used, the oral or articulate signs are forgotten. Such examples of diseased memory are now classified as *amnesia*, simple loss of memory; *amnesic aphasia*, loss of memory of spoken words (see APHASIA); and *amnesic agraphia*, loss of memory of written words. Most of these special deviations from health depend upon morbid changes in a very limited portion—'Broca's convolution'—of the left side of the brain. The discovery of this fact by Broca was the first of the brilliant discoveries as to the localisation of function in the brain cortex. See Feuchtersleben, *Medical Psychology;* and Ribot, *Les Maladies de la Mémoire* (1881).

Memphis, a celebrated Egyptian city, situated at the apex of the Delta, or Lower Egypt, the ancient capital of the country, called by the Egyptians *Men nefer*, or 'the Good Station,' by the Hebrews *Moph*, and by the Arabs *Memf*. It was founded by Menes, the first monarch of the 1st dynasty, who, according to Herodotus, changed the bed of the Nile, and made an embankment 100 stadia above Memphis to protect the new city against inundations, the remains of which still exist about 14 miles above Mitrahenny, the centre of old Memphis, and the site of the temple of Ptah. Menes fortified the city, and laid the foundations of the temple. The site was well chosen; protected alike by the Libyan and Arabian chains of mountains against the river and the incursions of the sand, defending the approach of the country from the incursions of Asiatic nomads, and communicating with the Red Sea and the Mediterranean. The city, which at one time had a circumference of 150 stadia, was composed of two portions—one built of crude bricks, the other, on which was the citadel, of calcareous stone. The palace, built by Menes, was enlarged by his son Athothis, and was always inhabited either by a monarch or by his viceroy. After the 6th dynasty the city declined in importance, and was apparently held by

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the Hyksos after the 13th and before the 18th (1500 B.C.). At this period Memphis was ruled by a viceroy, a prince of the blood, and still remained a religious capital. It rose again to great importance under the Saïte monarchs, about 600 B.C., who restored it; and it was conquered by Sennacherib. Its temples were magnificent, and comprised the Iseum, a large temple of Isis, completed by Amasis II. just prior to Cambyses (525 B.C.); a temple dedicated to Proteus, in the foreign quarter; the temple of the Apis, having a peristyle and court ornamented with figures, opposite the south propylæum of the temple of Ptah, where the sacred bull resided; the Serapeum, or temple of Serapis, discovered by M. Mariette; the Nilometer; a temple of Ra; and the shrine of the Cabiri. Here were the statues of Rameses II., one of which is known as 'the fallen colossus,' at Mitrahenny. Still more remarkable was the great necropolis of the city, in the centre of which towered the pyramids (see PYRAMIDS). During the attempts of the native rulers to throw off the Persian rule, Memphis was an important strategic point. Ochus inflicted severe injury on this town, having plundered the temples and thrown down the walls after he had driven out Nectanebes. Alexander the Great here worshipped the Apis, and his corpse was brought to this city by Ptolemy before it was finally transferred to Alexandria. The first Ptolemies were crowned in the Serapeum. Ptolemy VIII. destroyed the city, and it fell with the rest of Egypt under the Roman rule, and afterwards was conquered by 'Amr ibn el-Asi (640 A.D.). Its ruins, which served as quarries for later buildings, were large and important in the 13th century, when they were seen by Abd-ul-Latif; but little is now to be seen beyond deeply-buried walls. See works cited at EGYPT.

Memphis, a city and port of entry of Tennessee, stands on a high bluff on the east bank of the Mississippi River, 826 miles above New Orleans, and 230 miles by rail WSW. of Nashville. The river to this point is navigable for the largest seagoing vessels, and eight lines of railway terminate here; the trade of Memphis is accordingly very large. It is a handsome town, with wide, regular streets, and great warehouses bordering the esplanade that extends along the bluff. The public buildings include a custom-house, cotton exchange, a large hospital, a Roman Catholic college, and numerous churches. Memphis is one of the first cotton marts in the United States, and has numerous manufactories, including foundries, machine-shops, oil, lumber, and flour mills, steam-gins, &c. The city was visited by fearful epidemics of yellow fever in 1878 and 1879, since when its drainage and sewerage have been thoroughly reconstructed. Pop. (1850) 8841; (1870) 40,226; (1880) 33,592; (1890) 64,586. See *Harper's Magazine* (September 1888).

Menado. See CELEBES.

Ménage, GILES, a French writer, born at Angers in 1613, gave up the bar for the church, but chiefly spent his time in literary pursuits. He founded, in opposition to the Academy, a salon, the Mercuriales, which gained him a European reputation, and the ridicule of Molière as Vadius in *Femmes Savantes*. His *Dictionnaire Étymologique de la Langue Française* (1650; best ed. by Jault, 2 vols. 1750), and his *Origini della Lingua Italiana* (1669), are erudite works, but contain many fanciful etymologies. He died in 1692. See Life by Baret (Paris, 1859).

Menai Strait, a channel between Carnarvonshire and the island of Anglesey, running east-north-east from its southern extremity to Bangor, a distance of 14 miles, where it widens out into Beaumaris Bay. Its width varies from about 200 yards to 2 miles, whilst the scenery on both sides is very picturesque. The navigation is hazardous, but for the sake of expedition vessels under 100 tons, and occasionally some of larger size, pass through the strait. At its entrance the tides sometimes rise to a height of 30 feet; ordinary neap-tides, however, do not rise more than from 12 to 15½ feet. Communication between the mainland and Anglesey was formerly solely maintained by ferry-boats at different points, but since 1825 access has been afforded by a suspension bridge, and since 1850 by the Britannia Bridge. See BRIDGE.

Menam. See SIAM.

Menander, the most famous Greek poet of the New Comedy, was born at Athens in 342 B.C., and was drowned at the Piræus in 291. He was the friend, if not the pupil, of Theophrastus, himself a disciple of Plato and Aristotle; and he was the intimate of Epicurus, and the favourite of Demetrius Phalereus and Ptolemy the son of Lagus. His comedies seem to have been more successful with cultured than with popular audiences, for we are told that only eight out of a hundred comedies gained the prize. Unhappily we possess but fragments of his work, but we may safely take our estimate of the 'mundus Menander' from his close copyist and imitator, Terence, and from the words of such writers as Ovid, Propertius, and Pliny. The Attic New Comedy was essentially domestic rather than political in character, and its chief figures are conveniently summed up in the lines of Ovid:

> Dum fallax servus, durus pater, improba lena
> Vivet, dum meretrix blanda, Menandros erit.

His most famous comedy seems to have been the *Thais*, and it is interesting that of the five lines preserved one is quoted by St Paul (1 Cor. xv. 33). The fragments will be found in Meineke's *Fragmenta Comicorum Græcorum*, and Kock's *Comicorum Atticorum Fragmenta*. See works on him by Guizot (1855) and Horkel (1857).

Menchikov. See MENSCHIKOFF.

Mencius, the Latin form of MENG-TSE, the name of a Chinese sage, a contemporary of Plato and Aristotle, who was born in the province of Shan-tung in 372 B.C. He was brought up by his mother—the pattern of all mothers ever since in the eyes of the Chinese—and founded a school on the model of that of his great predecessor Confucius, for whom Mencius entertained a feeling of reverent admiration. When forty years of age he led out his disciples and travelled from one princely court to another during more than twenty years, seeking a ruler who would put into practice his system of social and political order. But, finding none, he again withdrew into retirement, and died in 289 B.C. After his death his disciples collected his conversations and exhortations, and published them as the *Book of Meng-tse*. The aim of Mencius' teaching was essentially practical: how men, especially the rulers of men, shall best regulate their conduct, both public and private. The philosophic root of his system is belief in the ethical goodness of man's nature, which quality he takes to be the essential characteristic of the humanity of men. From this root grow the cardinal virtues of benevolence, righteousness, moral wisdom, and propriety of conduct. It should be the aim of the individual to perfect himself by practising these virtues in all the relations of his social and political life. The flowering of this goodly plant which Mencius planted for the ordering of the lives of men, both individual and collective, assumed the form of a liberal and enlightened system of political economy. Amongst other things he advocated freedom of

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trade, the deposition of unworthy rulers, division of labour, inspection of work by the government, encouragement of markets, maintenance of good roads and bridges, &c., condemnation of war, care for the poor and neglected, but above all the promotion of education—the summary of the whole being that the welfare of the people should be the chief consideration of the state. There is also an aristocratic element in his teaching. The highest types of individual character are exhibited by the scholar, the great man, the superior man or sage, and the holy or ideal man; their personal example is the best educator the people can have. The fruits of Mencius' teaching have always been highly valued by his countrymen from his own times to the present. 'The chief *dicta* of modern Chinese ethics and politics are mostly taken literally from Mencius, or adhere closely to his teaching.'

See Legge, *Life and Works of Mencius* (1875; 'Chinese Classics' series); and Faber, *Mind of Mencius* (Eng. trans. 1882).

Mende, capital of the French department of Lozère, on the Lot, in a valley surrounded by high hills, 66 miles NW. of Nîmes, has a cathedral, and manufactures serges and coarse cloths. Pop. 6740.

Mendeans. See MANDÆANS.

Mendeleëff, DMITRI IVANOVITCH, chemist, was born at Tobolsk, 7th February 1834, studied at St Petersburg, and, after having taught at Simferopol, Odessa, and St Petersburg, became professor of Chemistry in the university of St Petersburg in 1866. He has enriched every section of chemical science, but is especially distinguished for his contributions to physical chemistry and chemical philosophy. See ATOMIC THEORY; and *Nature* (vol xl. 1889).

Mendelssohn, MOSES, philosopher, was born 6th September 1729, at Dessau. From his father, whose name was Mendel, a Jewish schoolmaster and scribe, he received his first education; and in his thirteenth year he proceeded to Berlin, where, amid very indigent circumstances, he contrived to learn Latin and modern languages, and to apply himself to the study of philosophy, into which early readings, chiefly of Maimonides' *Moreh Nebochim*, had initiated him already. After many years of comparative poverty he became the partner of a rich silk-manufacturer, whose children he had educated. The intimate friend of men like Lessing, Sulzer, Nicolai, he, directly and indirectly, contributed in a vast degree to the abolition of the disgraceful laws and brutal prejudices against the Jews. On the other hand, he acted in the most beneficial manner on his own co-religionists, by rousing them from the mental apathy with which they regarded in his day all that had not a distinct reference to religion, and by waging fierce war against their own religious and other prejudices. He died 4th January 1786, and Ramler wrote the following epitaph on him: 'True to the religion of his forefathers, wise as Socrates, teaching immortality, and becoming immortal like Socrates.' He was the prototype of Lessing's *Nathan*, and was called a 'second Moses.' He was a diligent student of Locke, Shaftesbury, and Pope: a zealous defender of enlightened Monotheism, and, in spite of Lessing, strongly anti-Spinozist. His principal works are a volume on Pope as a philosopher, along with Lessing (1755), on the Sensations (1755), on Evidence in Metaphysics (1763); *Phaedon* (1767), a dialogue on the immortality of the soul in the manner of Plato; *Jerusalem* (1783), a defence of Judaism as a religion; *Morgenstunden*, essays in refutation of Pantheism and Spinozism. His works were edited in 1845 (8 vols.), and again in 1880 (2 vols.). See the Life by Kayserling (2d ed. 1887).

Mendelssohn-Bartholdy, FELIX, composer, was born at Hamburg on February 3, 1809. The family name was already remarkable by the fame of his grandfather, Moses Mendelssohn. Abraham, the second son of Moses Mendelssohn, had entered a banking business in Paris, but subsequently, on his marriage with Lea Salomon in 1804, settled in Hamburg. The French occupation in 1811 forced him to escape with his family to Berlin, where he founded the eminent firm of bankers known by his name. He resolved about this time to bring up his children as Protestant Christians, and added the name of Bartholdy to that of Mendelssohn in order to distinguish his own from the Jewish branch of the family.

The education he bestowed on Felix appears to have been as liberal as it was systematic. In his eighth year we find the child studying composition under Zelter and the pianoforte under Ludwig Berger, besides receiving lessons in drawing and the violin. Two years later he made his first public appearance, playing the pianoforte part in a trio at a concert in Berlin. With 1820 began that period of prolific production which lasted almost till his death. At the same time he entered upon a ceaseless round of gaiety and activity which largely determined his character. The home-life of the Mendelssohn family was eminently suited to the musical tendencies of the boy. A concert was given at the house on alternate Sunday mornings, when some of Felix's compositions generally found a place in the programme. Within the next few years he formed the acquaintance of such men as Goethe, Weber, and Moscheles, and had composed his Symphony in C minor and the B minor Quartet. A short visit to Paris with his father in March 1825 did not impress him favourably with the French musicians.

The following July saw the completion of his opera, *Camacho's Wedding*, which was destined to be the beginning of his unpleasant relations with the Berliners; and his well-known Octet for strings was finished in October. With the composition of the *Midsummer Night's Dream* overture, in August 1826, Mendelssohn may be said to have attained his musical majority, and his lessons with Zelter ceased. On April 29, 1827, the opera *Camacho's Wedding* was produced in Berlin. Though received with vehement applause it never reached a second performance, owing, among other reasons, to the illness of one of the principal singers, and the personal criticisms on the work in the press. Soon after this Mendelssohn commenced the formation of a small choir of sixteen voices, which met at his house for the purpose of studying Bach's Passion Music; and, in spite of the difficulties of the work and the determined opposition of Zelter, the scheme culminated in the famous performance by the Singakademie on March 11, 1829, the first since Bach's death. For some reason, however, his success did not improve his relations with Berlin musicians. Accordingly, being now twenty years old, he resolved to leave home and to visit the different countries of Europe. England, afterwards the land of his most pleasant associations, was his first destination. He arrived in London on April 21, 1829, and was warmly welcomed by the Philharmonic Society. He made his first appearance at one of their concerts, when he conducted his Symphony in C minor. A tour through Scotland in the summer inspired him with the *Hebrides* overture and the Scotch Symphony.

During the next year he visited Munich and Vienna. By October he had reached Venice, and the following winter he spent in Rome. Returning to Munich he proceeded thence to Paris, paying his second visit to London in April 1832. He shortly afterwards returned to Berlin, having been

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absent three years. In the spring of 1833 he was invited to conduct the Lower Rhine festival at Düsseldorf, where his success led to his being offered the entire direction of the music for three years. He at once accepted the post and commenced his new duties in September. His work at the theatre, however, proved uncongenial, and was accordingly relinquished. His stay at Düsseldorf was full of responsibilities and worries, and he ultimately left the town in October 1835 to conduct the Gewandhaus concerts at Leipzig. A subsequent visit to Frankfort brought him in contact with Rossini, and was also the occasion of his first meeting with Cecile Jeanrenaud, who afterwards became his wife. The marriage took place in 1837, and was followed by a visit to Birmingham, where he conducted his *St Paul*, which had been first heard at Düsseldorf the previous year. His attention was now chiefly devoted to Leipzig, but September 1840 found him again at Birmingham conducting the *Lobgesang*. About this time Mendelssohn was requisitioned by the king of Prussia to go to Berlin to assist in the foundation of an Academy of Arts; and, though loth to leave a place where he was so much appreciated and beloved as in Leipzig, he removed to Berlin in May 1841, on the understanding that his stay there should not exceed one year. The king's idea of reviving the ancient Greek tragedies led to the composition by Mendelssohn of the music to the *Antigone* and *Œdipus*.

In 1843 he had the satisfaction of seeing his favourite scheme carried into effect by the opening of the new music-school at Leipzig, with Schumann and David among his associates. He was in London the following year to conduct the last five concerts of the Philharmonic season; and in 1846 he paid his ninth visit to England for the production of *Elijah*, which took place at Birmingham on September 26. But his hard work was now beginning to tell on him, for, although his Berlin duties and his position as chief of the Leipzig Conservatorium entailed constant labour and anxiety, he persisted in carrying out all his engagements. He had scarcely returned from his tenth and last visit to England, in May 1847, when the news of his sister Fanny's death reached him. Periods of illness and depression rapidly followed; and on November 4, 1847, he expired at his house in Leipzig. The body was conveyed to Berlin, and was interred in the family burial-place on the Alte Dreifaltigkeit Kirchhof.

In stature Mendelssohn was short, and his handsome countenance was of a decidedly Jewish cast. He was eminent both as pianist and organist, especially in his rendering of the works of Bach, Mozart, and Beethoven. He moreover possessed a remarkable facility of improvisation. His gifts also included a talent for landscape-drawing; and he has left behind him a whole series of sketches illustrating his different journeys. His music dwells almost exclusively on the sunny and gay side of life. Rarely, if ever, does he touch the innermost depths of passion and feeling. Yet it can never be a matter of regret to us that Mendelssohn was spared misfortunes such as fell to the lot of Beethoven and Schumann, and has thus given us music which, though lacking the profounder beauties and more pathetic qualities found in their works, has always the power to imbue us with his own spirit of habitual cheerfulness. He shares with Handel the exceptional lot of having been able to appeal successfully to English audiences. For the last forty years his *Elijah* has enjoyed a popularity equal to that of the *Messiah* itself.

See two collections of Mendelssohn's Letters (1861 and 1863; trans. by Lady Wallace, 1862–63), and those to the Moscheles (1888); the Lives by Benedict (1850), Moscheles (1873; trans. by Coleridge), and Lampadius (1886); Reminiscences by Devrient (1869; trans. by Mrs Macfarren), Hiller (1874), Horsley (1873), Marx (1865); Hensel, *Die Familie Mendelssohn* (1879; trans. 1884); and other works quoted in the article in Sir George Grove's *Dictionary*.

Mendicancy. In spite of the stringency of the laws against vagrancy and begging, and the numerous aid societies in every town in Britain for the relief of the poor and unemployed, quite an army of men, women, and children wander from place to place, and pick up a living from the thoughtless benevolence of their better-off and more industrious neighbours. This class is largely recruited from the lazy, idle, drunken, and vicious, though there is always a certain percentage who are really the victims of misfortune. Though the law is against begging—English statutes for the repression of mendicancy date from the 14th century—there is no law against giving to beggars. But indiscriminate charity only feeds the evil it seeks to remove, and the weak-willed, shiftless population continues to be a problem to the benevolent. The truest charity consists in helping people to help themselves, and those societies and individuals are most useful that aid the fallen to gain work and self-respect, and so rise in the social scale. There are no fewer than 83 societies in Great Britain for improving the condition of the poor, 42 of which are in London and 11 in Scotland. The relief given may consist in supplying immediate necessities, helping the poor into hospitals and convalescent homes, to emigrate, or to secure temporary work. Tickets are in some cases supplied to subscribers, which entitle the party to whom they are given to one meal. Tickets for a night's shelter can also be had, to be given instead of money. The Mendicity Society in London (established for the suppression of public begging in 1818), whose work has been much aided by the Charity Organisation Society (see CHARITIES), has caused some 25,000 vagrants to be convicted as impostors, and relieves some 13,000 or 14,000 cases in a year. A police census of December 23, 1888, credited Edinburgh, in a population of a little over a quarter of a million, with 898 common beggars and tramps; of whom 589 were Scotch, 210 Irish, 83 English, and 16 foreigners. In London it is calculated that one in thirty of the inhabitants live on charity; in Paris, where there is a well-organised syndicate of professional mendicants, one in eighteen (see *Chambers's Journal*, 1890). Mr Booth estimated that there were 3,000,000 persons in England who could not live for a week on their own resources, including 100,000 homeless waifs, sleeping on or under bridges, and hedgerows, carts, &c., and for them he devised the scheme of rescue propounded in his *In Darkest England* (1890). See also POOR-LAWS, VAGRANTS.

Mendicant Orders, certain religious associations in the Roman Church, which, carrying out the principle of religious poverty and self-humiliation to its fullest extent, make it a part of their profession to denude themselves of all property, whether real or personal, and to subsist upon alms. In the mendicant orders alms were commonly collected by the lay-brothers; in some, by actual solicitation; in others, by the ringing of the convent bell when the stock of provisions was exhausted. See the articles DOMINICANS, FRANCISCANS, CARMELITES, AUGUSTINIANS; also FRIAR.

Mendip Hills, a range in Somersetshire, extending 23 miles south-eastward from Weston-super-Mare to Shepton Mallet, and 3 to 6 miles in breadth. The highest point is Black Down (1067 feet). The limestone of the Mendips is pierced by numerous caverns, some of which have yielded prehistoric

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remains; and lead-mining, now much decreased in importance, has been carried on from pre-Roman days, calamine-mining being a later industry.

Mendoza, a western department of the Argentine Republic, with an area of 62,000 sq. m., and a pop. (1887) of 160,000. The Andes occupy the western portion: Aconcagua (22,427 feet), the highest peak in America, is on the north-west frontier. The rest of the province is pampa land, fertile wherever it can be irrigated by the waters of the Mendoza and other streams, but elsewhere almost worthless. The annual rainfall is only 8 inches. Minerals, especially copper, abound, and are beginning to be worked; petroleum and coal have also been found. Vines flourish, and a large quantity of wine is exported to the other provinces.—The *capital*, Mendoza, 640 miles by rail W. by N. of Buenos Ayres, is on the transcontinental railway, which reached this point in 1884. It is a handsome town, lying among vineyards and gardens, 2320 feet above the sea; its streets have shade-trees and streams of running water, and the Alameda is the most beautiful on the continent. An active trade is carried on with Chili. An earthquake in 1861 destroyed Mendoza (founded 1559) and 13,000 of its 14,600 inhabitants; many of the ruins are still visible in the larger city which has been raised on its site. Pop. 20,000.

Mendoza, the name of an illustrious family that throughout Spanish history distinguished itself wherever distinction was to be won, in war, statesmanship, diplomacy, the church, and literature. A descent from the Cid has been claimed for it; but it was of Basque origin, and its progenitors the lords of Biscay some generations before the Cid's time. Of its more notable members the first is Iñigo Lopez de Mendoza, created Marquis of Santillana by John II. of Castile in 1445 for his services on the field of Olmedo and elsewhere. Besides being a gallant soldier, he was a wise statesman and a sturdy patriot, and in himself a proof of the truth of his own saying, that 'the lance never blunted the pen, nor the pen the lance,' for among the poets he stood next to Juan de Mena, and his exquisite little song of the 'Vaquera de la Finojosa' has secured a place for him in every Spanish anthology. He served literature, moreover, by leaving an excellent account of the Provençal, Catalan, and Valencian poets, and he has a further claim to remembrance as the first of folklorists and the first collector of popular proverbs 'such as the old women repeat over the fire.' The most famous of his six sons was Pedro, Archbishop of Toledo, commonly called 'The Grand Cardinal,' who was for many years the trusted prime-minister of Ferdinand and Isabella, a man whose integrity and nobleness of character, no less than his commanding abilities, make him a prominent figure in an age by no means poor in great men.

The best known of the name is the marquis's great-grandson, DIEGO HURTADO DE MENDOZA (1503–75), the strong-handed lieutenant to whom Charles V. entrusted the conduct of his Italian policy and the representation of his views at the Council of Trent. He inherited a full measure of his great-grandfather's gifts as a statesman and as a man of letters. Almost as much as his kinsman Garcilaso de la Vega and Juan Boscan he was instrumental in grafting Italian poetry on the Spanish stem, but as a poet he was more national than either of his allies. His largest work is his *War of Granada*, a history of the revolt of the Moriscoes in 1568–70 against the oppression of Philip II. It is constructed on Latin models, but a masterpiece of Spanish prose, marked throughout by rare narrative power, and by a generous spirit towards the miserable Moriscoes which is rarer still. Greater glory yet would surround his name if his right to the little tale of *Lazarillo de Tormes* could be proved, but his title, it must be confessed, is not quite clearly made out. We have, it is true, the positive assertion of the Flemish scholar André in his catalogue of Spanish authors (1607), and we must suppose he had evidence that satisfied him, but what it was we know not. Beyond this there is nothing but the consensus of opinion in Spain, the fact that there is no other claimant (for inexorable dates dispose of Ortega's claim), and a certain amount of circumstantial evidence, which, however, partly rests upon the probable but not yet proved existence of a first edition printed at Antwerp in 1553. The silence of Mendoza's family and early editors is, however, no argument against his authorship, but rather the contrary. That they should have been chary of claiming for him a book full of Reformation ideas is not strange, but it is strange that they should not have denied, if they could, his reported connection with it.

Menelaus, in ancient Greek heroic history, was king of Lacedæmon, the younger brother of Agamemnon, and husband of the famous Helen (q.v.).

Menes. See EGYPT (*Chronology and History*).

Menevian, one of the subdivisions of the Cambrian System (q.v.).

Mengs, ANTON RAPHAEL, artist and writer on art, was born at Aussig, in Bohemia, March 12, 1728. His father, Israel Mengs, was himself a painter, and from him young Raphael received his first instructions in art. At the age of thirteen he went to Rome, where he remained three years. On his return to Dresden, in 1744, he was appointed court-painter to the king of Poland and Saxony, but was not prevented from living at Rome, where he became a Catholic and married. In 1754 he became director of the school of painting of the Capitol. After three years he visited Spain. To this period belongs his most celebrated effort; it represents the Apotheosis of the Emperor Trajan, and is executed on the dome of the grand saloon in the royal palace at Madrid. He returned again to Rome in 1776, where he died 29th June 1779. He was a learned and scholarly painter, but his works, though lofty in their subjects, seldom exhibit more than a correct and cultivated taste. His writings were edited in 1780.

Meng-tse. See MENCIUS.

Menhaden (*Clupea menhaden*), the name, especially in Massachusetts and Rhode Island, of a species of herring or shad, abundant off the eastern coast of the United States. Other local names are Whitefish and Hardhead (in Maine), Bony Fish and Mossbunker (in New York). It is much used for bait and is very rich in oil, while the refuse furnishes valuable manure. Economically it is one of the most important North American fishes. See G. B. Goode's *Natural History of the Menhaden* (Washington, 1879).

Menhir. See STANDING STONES.

Ménier, ÉMILE JUSTIN, French manufacturer and writer, was born at Paris on 18th May 1826, and died at Noisiel-sur-Marne, 17th February 1881. He established at Noisiel the celebrated chocolate factory, with a branch in London, chemical works at St Denis, and a sugar manufactory at Roye, besides a caoutchouc factory, and in Nicaragua a cocoa plantation. A warm advocate of free trade, he expounded his views in *Économie Rurale* (1875), *L'Avenir Économique* (2 vols. 1875–79), &c.

Menin, a town of West Flanders, Belgium, 7 miles by rail SW. of Courtrai, stands on the left bank of the Lys, which separates it from France. It was fortified by Vauban, but its works have been demolished. Pop. 12,513.

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Meningi'tis (Gr. *mēninx*, 'a membrane') is the term employed in medicine to designate inflammation of the membranes investing the brain and spinal cord, of which in this relation the innermost—the *pia-mater*—is the most important. Far the most frequent form of meningitis in Britain is the tubercular, already described under Hydrocephalus (q.v.); and, as the main symptoms of other forms are similar, it is unnecessary to repeat them here.

Epidemic cerebro-spinal meningitis, or *Cerebro-spinal fever*.—Outbreaks have occurred from time to time during the 19th century in the northern hemisphere, less frequently in the British Islands than in most of the other countries where qualified observers are found, of an epidemic disease affecting chiefly the membranes of the brain and cord. It usually begins suddenly with fever and violent headache; vomiting, giddiness, stupor, delirium, and other nervous symptoms succeed, the most distinctive of which is a peculiar rigidity of the muscles of the neck and back. The disease is extremely variable in severity; sometimes it is fatal in less than twenty-four hours; sometimes so slight as only to confine the patient to bed for a few days. The majority lie between these extremes, improvement in favourable cases beginning after a week or two. Convalescence is often very slow. It occurs chiefly in children and young adults. It is not clearly distinguishable from other forms of meningitis except by its mode of occurrence, generally in somewhat localised and limited outbreaks. If contagious, it is only feebly so. Treatment must be conducted on general principles, as no specific is yet known.

Simple meningitis (i.e. not traceable to tubercle or to the epidemic form) is most often caused by injury, but may result from disease of the skull, pyæmia, and other diseases, and has even been caused by excessive exposure of the head to the sun. It usually begins, unlike the tubercular form, quite suddenly; and it too is an extremely fatal disease. But the outlook is not quite so hopeless in simple meningitis; and even cases which appear desperate do sometimes recover. The essentials of treatment are rest and quiet in a darkened room, and little food of the lightest kind. Ice to the head, blistering, blood-letting, local or general, and free purgation sometimes seem beneficial.

Meningocele. See ENCEPHALOCELE.

Menippus, a satirist who lived in the first half of the 3d century B.C., was born a Phœnician slave, and became a Cynic philosopher. His works in Greek have perished, and he is known only through the imitations of Marcus Terentius Varro (q.v.), whose own fragments bear the title of *Menippean Satires*.—The name was adopted as title for a famous French collection of political satires in prose and verse, the *Satire Ménippée*, which appeared in 1594 at the crucial period of the League.

Mennonites, a Protestant sect, combining some of the distinctive characteristics of the Baptists and the Quakers. Their principal tenet is the administration of baptism only upon confession of faith; consequently they do not baptise infants. They attach more importance to the ordering of the Christian life than to doctrinal points, ranking discipline and rectitude of life before learning and the scientific elaboration of dogmas. They refuse to take oaths, to bear arms, condemn every kind of revenge and divorce (except for adultery), and object to fill civic and state offices, holding all kinds of magistracy to be necessary for the present, but foreign to the kingdom of Christ. The church is the community of the saints, which must be kept pure by strict discipline. Grace they hold to be designed for all, and their views of the Lord's Supper fall in with those of Zwingli; in its celebration the rite of feet-washing is retained in most congregations. They have bishops, preachers, and deacons. The first congregation to profess these principles was formed at Zurich in 1525 by three men, Grebel, Manz, and Blaurock. Thence the sect spread rapidly through Switzerland and the south of Germany and Austria, establishing itself in greatest strength at St Gall, Augsburg, and Strasburg. But a bitter persecution, in which 3000 persons perished, caused many to move into Moravia and into Holland. Contemporaneously with the formation of the Zurich congregation and its first years of propagandism was the appearance in Westphalia of the Anabaptists (q.v.), a sect professing some similar views, but guilty of most reprehensible fanatical excesses, in which the Swiss party had no share and with which they showed no sympathy. After the fanatical party had been suppressed, with much shedding of blood, in Münster, there arose a man of sound piety and great moderation, Menno Simons (1492–1559), who denounced the blasphemous zealots of Westphalia, and organised the scattered members and congregations of the more sober-minded throughout Holland and north Germany. His influence became so paramount that his name has been used ever since to designate the sect as a religious body. Dissentions broke out amongst them at a later time both in Switzerland and Holland, chiefly as to the degree of strictness of discipline to be enforced. In 1620 the stricter Ammanite or Upland Mennonites separated from the more tolerant Lowland Mennonites in Switzerland. In Holland the first disruption occurred in 1554; the more liberal section in North Holland were called Waterlanders, though they exchanged the name of Mennonites for Baptist Communities. The advocates for greater strictness showed much want of cohesion, the various parties being known by such titles as Old Flemings, Ukewallists, Dompelers, Jan Jacob Christians, Apostoolites, Galenists, &c. All the Dutch Mennonites were, however, reunited in 1801. At the present time they number about 32,000, divided among more than 100 congregations. The German and Swiss Mennonites probably number nearly 25,000. In 1783 Catharine of Russia introduced colonies of German Mennonites into south Russia; others joined them after 1867. But in 1871—at which time they numbered close upon 40,000—the Russian emperor decreed that they should be liable to conscription for the army, and should be deprived of certain others of their privileges. This caused many of them to emigrate to the United States, where they settled principally in Minnesota and Kansas; others have proceeded of late years to Brazil. But Mennonite refugees from Alsace, the Palatinate, and Holland had already reached America as early as 1683, in which year the first Mennonite church in the States was organised at Germantown in Pennsylvania. At the present time there are about 100,000 professing this form of religious life in the United States and Canada. The most important groups into which they are divided are known as Old Mennonites, Reformed Mennonites or Herr's People, New Mennonites, Evangelical Mennonites, and Amish or Omish Mennonites, also known as Hookers and as Buttonites. Nearly all Mennonites throughout the world are farmers; for culture, integrity, and philanthropic enlightenment they stand everywhere high in the regards of their neighbours.

See Bloupet ten Cate, *Geschiedenis der Doopsgezinden* (5 vols. 1839–47); J. A. Starck, *Geschichte der Taufe und der Taufgesinnten* (1789); N. Browne's *Life of Menno* (Phila. 1853); [Mrs Brons] *Ursprung, Entwickelung, und Schicksale der Taufgesinnten* (1884); and Hoop Scheffer

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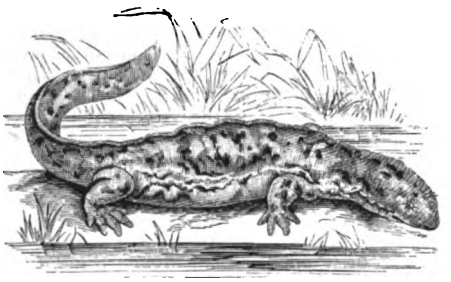
in Herzog-Plitt's *Real-Encyklopädie* (new ed.), who gives a full bibliography.

Menopome (*Protonopsis horrida*), a large North American amphibian in the Salamander order. It is widely distributed in the rivers of the Mississippi basin, and is well known as the 'hell-bender,' 'alligator,' 'water-dog,' &c., names which suggest its fierce characteristics. It resembles the



Menopome or Hell-bender (*Protonopsis horrida*).

salamander in form, has four well-developed limbs, and a persistent gill-aperture. It attains a length of 18 inches to 2 feet, and has extraordinary powers of voracity and vitality.

Menschikoff, ALEXANDER DANILOVITCH, a Russian field-marshal and minister of state, was born at Moscow, 16th November 1672. Lefort, the favourite of Peter the Great, saw him selling tarts in the street, took him into his own service, and introduced him to the notice of his imperial master. Rising rapidly in the Czar's favour, he distinguished himself at the siege of Azov, and afterwards accompanied Peter in his travels to Holland and England. On the death of Lefort (1699) he was made chief favourite. During the years (1702–13) of the war with Sweden he played important parts at the siege of Schlüsselburg, the battles of Kalisch and Pultowa—on the field of Pultowa Peter made him field-marshal—the capture of Riga, in the occupation of Courland and Pomerania, and at the capture of Stettin. At the capture of Marienburg the woman who afterwards became the wife of Peter, Catharine I., fell into Menschikoff's hands, and was through him introduced to the czar. Towards the end of Peter's reign Menschikoff lost favour owing to his extortions and suspected duplicities. But when Peter died he secured the succession of Catharine, and during her reign and that of her successor, her youthful grandson, Peter II., he governed Russia with almost absolute authority. His ambitious schemes—he was about to marry his daughter to the young czar—and the dislike of the old nobility led to his overthrow by the Dolgoroukis, who banished him to Siberia (September 1727) and confiscated his immense estates and treasures. He died 2d November 1729.—His great-grandson, ALEXANDER SERGEIEVITCH, was born in 1789. He served in the campaigns of 1812–15, and rose to the rank of general. In the Turkish campaign of 1828 he took Anapa after a short siege, but before Varna received so severe a wound as compelled his retirement. After his recovery he was made head of the Russian navy, which he raised to a high state of efficiency. In March 1853 he was sent as ambassador to Constantinople, where his overbearing behaviour produced a speedy rupture between the Porte and the czar, and brought about the Crimean war. In this war he commanded at the battles of Alma and Inkermann, and displayed great energy in defending Sebastopol; but in 1855 he was recalled because of a severe attack of illness. Menschikoff was till his death on 2d May 1869 one of the most prominent members of the old Russian party.

Menstruation is the term applied to the discharge of blood which issues every month from the generative organs of the human female during the period in which she is capable of procreation. The first appearance of this discharge, to which the terms *menses* and *catamenia* (each having reference to the monthly period) are indiscriminately applied, is a decided indication of the arrival of the period of commencing womanhood, and is usually accompanied by an enlargement of the mammary glands and other less conspicuous changes. Among Teutonic races menstruation usually commences between the fourteenth and the sixteenth years, and terminates between the forty-eighth and fifty-second years. The interval which most commonly elapses between the successive appearances of the discharge is about four weeks, although it is often shorter; and the duration of the flow is usually three or four days, but is liable to great variations. The first appearance of the discharge is usually preceded and accompanied by pain in the loins and general disturbance of the system, and in many women these symptoms invariably accompany the discharge. As a general rule there is no menstrual flow during pregnancy and lactation, and its cessation is one of the first signs that conception has taken place. Anomalies and disturbances (retention, suppression, undue copiousness, &c.) of the menstrual discharge are a frequent cause or symptom of illness.

Mensuration, the name of that branch of the application of arithmetic to geometry which teaches, from the actual measurement of certain lines of a figure, how to find, by calculation, the length of other lines, the area of surfaces, and the volume of solids. The determination of lines is, however, generally treated of under Trigonometry (q.v.), and surfaces and solids are now understood to form the sole subjects of mensuration. To find the length of a line (except in cases where the length may be calculated from other known lines, as in trigonometry) we have to apply the unit of length (in the shape of a footrule, a yard measure, a chain), and discover by actual trial how many units the line contains. But in measuring a surface or a solid we do not require to apply an actual square board, or a cubic block, or even to divide it into such squares or blocks; we have only to measure certain of its boundary lines or *dimensions;* and from them we can calculate or infer the contents. For example, to find the area of a rectangle it is sufficient to measure two adjacent sides and find the product of these in terms of the unit of length chosen; 7 feet × 3 feet = 21 square feet.

The areas of other figures are found from this, by the aid of certain relations or properties of those figures demonstrated by pure geometry; for instance, the area of a parallelogram is the same as the area of a rectangle having the same base and altitude, and is therefore equal to the base multiplied by the height. As a triangle is half of a parallelogram, the rule for its area can be at once deduced. Irregular quadrilaterals and polygons are measured by dividing them into triangles, the area of each of which is separately calculated. For the area of the circle, see CIRCLE. The volume of a rectangular parallelopiped is found in cubic inches by multiplying together the length, breadth, and depth in inches; and the oblique parallelopiped, prism, or cylinder, by multiplying the area of the base by the height.

Mentana, a small village 12 miles NE. of Rome, where, 3d November 1867, the Garibaldians were defeated by the papal and French troops.

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Menteith, LAKE OF, a beautiful sheet of water in south-west Perthshire, 17 miles W. by N. of Stirling. Lying 55 feet above sea-level, it has an utmost length and breadth of 1½ and 1 mile, and a depth in places of 80 feet. It sends off Goodie Water 9 miles east-south-eastward to the Forth, and contains three islets—Inchmahome, Inchtalla, and Dog Isle. Inchmahome has remains of an Augustinian priory (1238), the refuge in 1547–48 of the child-queen Mary Stuart before her removal to France; whilst on Inchtalla is the ruined tower (1427) of the Earls of Menteith. That title was borne by a Celtic line in the 12th century, and afterwards by a Comyn, Stewarts, and Grahams (1427–1694). See Dr John Brown's *Horæ Subsecivæ* (1858), and Sir W. Fraser's *Red Book of Menteith* (2 vols. Edin. 1880).

Menthol is a camphor obtained from oil of peppermint by cooling. It has been used by the Japanese for 200 years and is known by them as Hakka-no-Hari; indeed, native gentlemen always went about till recently with a medicine-box containing this drug. The chief source is the *Mentha arvensis purpurescens*, the oil of which yields more menthol than that of peppermint. In many nervous affections, such as neuralgia, toothache, headache, &c., menthol in the form of cones often gives instant relief. When the cone is rubbed on the skin a twofold action results. The menthol rapidly evaporates, giving a sensation of cold; but if evaporation be prevented it acts as a rubefacient, producing a feeling of warmth. Menthol has also antiseptic properties, and is used with success in solution in diphtheria, &c. It has an odour resembling but differing from that of oil of peppermint. It is liable to be adulterated with thymol, eucalyptol, &c., and then is often irritating to the skin.

Mentone (Fr. *Menton*), a town in the department of Alpes Maritimes, France, is pleasantly situated on the Mediterranean, 1½ mile from the Italian frontier and 14 miles by rail NE. of Nice. Owing to its southern exposure, and the fact that spurs of the Alps shelter it on the north and west, it enjoys a beautiful climate—average for the year 61°—and so has become a favourite winter-resort of invalids and health-seekers from England, Germany, and other countries. The town stands on a promontory that divides its bay into two portions; the native town clings to the mountain side, whilst the hotels and villas for the visitors extend along the water's edge. The harbour is protected on the south and west by a sea-wall (1889). There is a trade chiefly in olive-oil, wine, lemons, skins, which fluctuates between £75,000 and £211,000 a year. Great damage was done to the place by an earthquake in February 1887. Pop. 8433. In the 14th century it was purchased by the lords of Monaco, and, except during the period of the revolution and down to 1815, when France seized it, the princes of Monaco kept possession till 1848. In that year the inhabitants voluntarily put themselves under the protection of Sardinia, but that power yielded the town to France twelve years later. See Dr Bennet, *Winter and Spring on the Shores of the Mediterranean* (5th ed. 1874) and *Maritime Alps and their Seaboard* (1888).

Mentor, the son of Alcimus, and trusted friend of Ulysses, who, on setting out for Troy, left him the charge of his household. By him the young Telemachus was educated, and his name has become a synonym for an instructor and guide.

Mentz. See MAINZ.

Menu. See MANU.

Menura. See LYRE-BIRD.

Menzaleh, LAKE, a coast lagoon of Egypt, extending east from the Damietta branch of the Nile, is separated from the Mediterranean by a narrow strip of land, with several openings. Its surface, 460 sq. m. in extent, is studded with islands, the most interesting of which is Tennees, the ancient Tennesus, with Roman remains of baths, tombs, &c. Its waters are full of fish, and its shores abound in wild-fowl. The Suez Canal passes through the eastern portion. The lake has an average depth of not more than 3 feet, except when the Nile, mouths of whose delta reach it, is in flood; and it is being gradually drained.

Menzel, ADOLF, painter, lithographer, illustrator, and engraver, was born 8th December 1815, at Breslau, and is best known for his drawings and oil-paintings illustrative of the times of Frederick the Great and William I., emperor—pictures characterised by historical fidelity, strong realistic conception, originality, and humour. His 'Adam and Eve,' 'Christ among the Doctors,' and 'Christ expelling the Money-changers' are also notable pictures. See Life by Wessely (1873), and the critical work of Jordan and Dohme (1885 *et seq.*)

Menzel, WOLFGANG, an eminent German author, was the son of a medical practitioner, and was born at Waldenburg, in Silesia, 21st June 1798. He studied at Jena and Bonn, was for four years schoolmaster at Aarau in Switzerland, and in 1825 returned to Germany. He first made himself known in the literary world by his witty *Streckverse* (1823). He subsequently lived mainly in Stuttgart, where he died 23d April 1873. He edited and contributed to literary magazines, and wrote a very large number of works—poems, romances, histories, literary criticism, political polemics, and Christian theology. The most important were a history of Germany (1825; Eng. trans. 1848), of German literature (1827; Eng. trans. 1840), of German poetry (1858), of Europe (1853–57), and of the world (*Allgemeine Weltgeschichte*, 16 vols. 1862–72), on Prussia's place in Germany (1866 and 1870), mythological researches (1842), the pre-Christian doctrine of immortality (1869), and autobiographical *Denkwürdigkeiten* (1876). He was almost constantly involved in controversy, attacking with equal zeal theological rationalists and political radicals, all whose tendencies seemed 'dangerous' to the Christian religion or the German monarchies, such as 'the Young Germany party' after 1830. Börne (q.v.) retaliated in the *Franzosenfresser* ('Frenchman-eater').

Mephistopheles, the name of one of the best-known personifications of the principle of evil. The word has been very variously explained, but is probably of Hebrew origin, like most names of devils in the history of magic, confounded with, and approximated in form to, the Greek μηφωτοφίλης, 'one who loves not light.' Mephistopheles owes all his modern vitality to Goethe's *Faust* (q.v.).

Meppel, a town in the Netherlands province of Drenthe, 18 miles N. by E. of Zwolle, has a trade in butter and linen manufactures. Pop. 8418.

Mc'quinez. See MIKNAS.

Meran, a town in the Tyrol, situated at the south side of the Alps, 100 miles by rail S. by W. of Innsbruck, is a celebrated winter-resort, especially for sufferers from chest diseases, has an old 15th-century castle, a 14th-century Gothic church, an English girls' school, &c. Pop. 5334, more than doubled in the season. See Fraser Rae's *Austrian Health-resorts* (1888).

Mercadante, SAVERIO, musical composer, was born at Altamura in Southern Italy, 26th June 1797, studied music at Naples, and began his career as a violinist and flutist. In 1818 he produced the first of some sixty operas, of which the

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more noteworthy are *L'Apoteosi d'Ercole* (1819), *Anacreonte* (1820), *Elisa e Claudio* (1821), *Donna Caritea* (1826), *I Briganti* (1836), *Il Giuramento* (1837), and *La Vestale* (1842). From 1827 to 1831 he was in Spain; in 1833 he was appointed musical director in the cathedral at Novara, and in 1840 of the conservatory of music at Naples. He died in that city, 17th December 1870—blind since 1861.

Mercantile Law, the branch of municipal law which is similar, and in many respects identical, in all the trading countries of the world. An understanding was earliest established in the department of maritime law, the history of which begins with such codes as the *Consolato del Mare*, published at Barcelona in 1494, and includes such a series of regulations as the English Merchant Shipping Acts (1854 to 1888), which consolidate and amend the law as to seamen and their contracts with employers, desertion, provisions, unseaworthy ships, pilotage, signals, deck cargoes, the load-line, life-saving apparatus, &c. Mercantile and maritime law is dealt with in this work under a large number of heads, as

Apprentice.	Debt.	Master and Servant.
Bankruptcy.	Employers' Liability.	Partnership.
Bill.	Insurance.	Plimsoll.
Company.	International Law.	Weights and Measures.

Mercantile System, that system in political economy which regards it as a government's chief end to secure a favourable balance of trade—to get the country to import as little as possible of the produce of other countries, and export as much as possible of its own, so that more money is received than is paid away. The policy of the Emperor Charles V. was regulated by this aim, as was that of Henry VIII. and Queen Elizabeth; and the Navigation Laws (q.v.) of Cromwell founded the English empire of the seas. Colbert (q.v.) was regarded as the most systematic mercantilist. Among English exponents of the system were Sir Josiah Child and Sir William Temple. See BALANCE OF TRADE, POLITICAL ECONOMY.

Mercator (the Latinised form of KREMER), a Flemish mathematician and geographer of German extraction, 1512–92. See MAP.

Mercedes, in Argentina, (1) a city 61 miles by rail W. of Buenos Ayres, with a free library and hospital, soap-factories and steam-mills, and 8000 inhabitants (many Irish); and (2) a town 55 miles by rail ESE. of San Luis city, with 6000 inhabitants. (3) Mercedes is also the name of the capital (4000) of Soriano province, in Uruguay.

Mercenaries, or STIPENDIARIES, men who received pay for their services as soldiers, especially as distinguished from the feudal and general levies owing military service to the crown. Such men were often foreigners, and the name has come to mean only foreign auxiliaries. Hired professional soldiers appear very early in the history of military organisation (see ARMY). Foreign mercenaries appear in the armies of Alexander the Great and the Romans. They were common in all armies, but generally engaged for a single campaign only. In England, Harold had a body of Danes in his army when he defeated the Norwegian king—the *huscarls*, a body originally established by Canute. William III. had for some time a body of Dutch troops in his pay after he became king of England; and throughout the 18th century Hessian and Hanoverian regiments were constantly in the pay of the British government for temporary purposes. Hessians fought for great Britain in the first American war; and the Landgrave of Hesse, who sold his troops at so much a head, received upwards of half a million for soldiers lost in that campaign. During the Irish rebellion, again, in 1798, many Hessian troops were employed.

On the outbreak of the continental war in 1793 it was determined to increase the British army by the addition of a large body of foreigners; and accordingly in 1794 an act was passed for the embodiment of the 'King's German Legion,' consisting of 15,000 men. These troops, who were increased in the course of the war to nearly double that number, distinguished themselves in various engagements, and formed some of the most reliable regiments. It was common during the Peninsular war to enlist deserters and prisoners of war into the British army, but such recruits were not reliable when opposed to their fellow-countrymen. Corps of French *émigrés*, as the Chasseurs Britanniques, which served through the Peninsular war and in America, the York Chasseurs, in which some Turks were enrolled when at Malta, and others, were also organised. The whole of the foreign legions were disbanded in 1815, the officers being placed on half-pay.

During the Russian war in 1854 the British government again had recourse to the enlistment of foreigners. The numbers authorised were 10,000 Germans, 5000 Swiss, and 5000 Italians, with the same pay as British troops. About half were enrolled, and had become very efficient, when hostilities ceased, and they were disbanded at a great cost for gratuities, &c. Foreigners may enlist into the British army, but the Army Act of 1881 provides that the proportion of aliens in any corps at one time shall not exceed one to every fifty British subjects, except in the case of negroes and persons of colour, and that no alien shall be eligible to hold a commission as an officer. British-born soldiers have often served abroad. There was a famous Scots Guard (q.v.) in France from the days of Charles VI. down to 1759; many Scotsmen fought for Gustavus Adolphus; and Englishmen, Scotsmen, and Irishmen, singly and in bodies, have served during troublous times in most European countries; see GORDON (PATRICK), KEITH, HOBART PASHA. A British legion was raised in 1836 by Sir De Lacy Evans to support the queen of Spain against the Carlists (see EVANS).

The Swiss auxiliaries used to form a regular contingent in many of the armies of Europe, especially of France and Italy. Over 1,000,000 served in France from the time of Louis XI. to that of Louis XIV. (1465–1715). The Swiss usually served only on condition of being commanded by their own officers, and occasionally these officers obtained distinction and fame. But the privates returned home poor and often demoralised; and the cantons which supplied most mercenaries suffered severely by their absence. After the French Revolution the cantons ceased publicly to hire out their subjects; and after 1830 most of the cantons forbade foreign enlistment. In 1859 the Confederacy passed a severe law against recruitment for service abroad. There is still, however, a large contingent of Swiss mercenaries in the Dutch East Indian Colonies. The Papal Swiss troops have shrunk to a body-guard of about 100 men. See CONDOTTIERI, FREE-LANCES.

Merchandise Marks. See TRADE MARKS.

Merchant Taylors' School. This great London day-school, with 500 boys in 1890, was founded, and is still governed, solely by the master, wardens, and company of Merchant Taylors. The first school-house was built in 1561 in Suffolk Lane. This building was destroyed in the great fire of 1666, but it was in 1671–74 rebuilt on the same site. When the Charterhouse School was removed into the country, the Merchant Taylors bought land from the governors of the Charterhouse for

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£90,000, and in 1873–74 erected, at a cost of £30,000, their present school-house on the site of the old gown boys' quarters of the Charterhouse. Richard Mulcaster was the first master of the school, and among its scholars have been Edmund Spenser, Bishop Andrewes, James Shirley, Archbishop Juxon, Titus Oates, Lord Clive, Charles Mathews, and Sir Henry Ellis. See the Rev. C. J. Robinson's *Register of the Scholars admitted to Merchant Taylors', 1562–1874* (2 vols. 1882–83).

Mercia, the great Anglian kingdom of central England. The name, originally limited to the district around Tamworth and Lichfield and the Upper Trent valley, refers to a 'march' or frontier that had to be defended against hostile Welshmen. The first settlements were most probably made in the second half of the 6th century, but Mercia first rose into real importance, and indeed grew into Middle England, under the vigorous rule of Penda (626–655). His nephew, Wulfhere (659–675), pushed back the Northumbrians, and extended the boundary southward to the Thames, and Ethelbald (716–755) spread his conquests round all the neighbouring states. But the mightiest kings of Mercia were Offa (757–795) and Cenwulf (796–819), and after their time its power rapidly declined before the invasions of the Danes on the one side, and the spread of the West Saxon kingdom on the other. At length it became one of the great earldoms, and Elfgar, Leofric, Edwin, and Morcar retained at least the shadow of past power. See ENGLAND (*History*); also DIALECT.

Mercury. See HERMES.

Mercury, or QUICKSILVER (sym. Hg; atomic weight = 200; sp. gr. 13·6), one of the so-called noble metals, remarkable as being the only metal that is fluid at ordinary temperatures. It is of a silvery white colour, with a striking metallic lustre. When pure it runs in small spherical drops over smooth surfaces; but when not perfectly pure the drops assume an elongated or *tailed* form, and often leave a gray stain on the surface of glass or porcelain. Moreover, the pure metal, when shaken with air, presents no change upon its surface; while if impure it becomes covered with a gray film. It is slightly volatile at ordinary temperatures, and at 662° F. it boils, and forms a colourless vapour of sp. gr. 6·976. Hence it is capable of being distilled; and the fact of its being somewhat volatile at ordinary temperatures helps to explain its pernicious effects upon those whose trades require them to come much in contact with it—as, for example, the makers of barometers, looking-glasses, &c. At a temperature of − 39° F. it freezes, when it contracts considerably, and becomes malleable. In consequence of the uniform rate at which it expands when heated, from considerably below 0° to above 300°, it is employed in the construction of the mercurial thermometer.

All mercurial compounds are either volatilised or decomposed by heat; and when heated with carbonate of soda they yield metallic mercury. Native or virgin quicksilver only occurs in small quantity, usually in cavities of mercurial ores. Of these ores by far the most important is Cinnabar (q.v.). There are two means of obtaining the metal from the cinnabar: the ore may be burned in a furnace, in which case the sulphur is given off as sulphurous acid, and the mercury is collected in a condensing chamber; or the ore may be distilled with some substance capable of combining with the sulphur—as, for example, with slaked lime or iron filings. The mercury as imported is usually almost chemically pure. If the presence of other metals is suspected, it may be pressed through leather, redistilled, and then digested for a few days in dilute cold nitric acid, which exerts little action on the mercury if more oxidisable metals are present; or better, in a solution of mercuric nitrate, which deposits mercury and takes up the more oxidisable metals. The mercury, after being washed with water, is chemically pure.

Mercury is first spoken of by Theophrastus (3d century B.C.); the name *hydrargyros* (whence comes the symbol Hg) dates from Dioscorides. Greeks and Phœnicians procured cinnabar from Almaden in Spain. After the discovery of the New World, the mercury of Peru was famous. California now produces the great bulk of the mercury of commerce, and most of it comes from the New Almaden mine. The total produce of California was 60,851 flasks (of 76½ lb. each) in 1881; in 1888 it had sunk to 33,250 flasks (value $1,413,125).

There are two oxides of mercury, the black suboxide, Hg_2O, and the red oxide, HgO. Both of these lose all their oxygen when heated, and form salts with acids. The *black suboxide*, although a powerful base, is very unstable when isolated, being readily converted by gentle warmth, or even by mere exposure to light, into red oxide and the metal: $Hg_2O = HgO + Hg$. The most important of its salts is the nitrate, $Hg_2(NO_3)_2 + 2Aq$, from whose watery solution ammonia throws down a black precipitate known in pharmacy as *Mercurius solubilis Hahnemanni*, from its discoverer, and consisting essentially of the black suboxide with some ammonia and nitric acid, which are apparently in combination. Of the *red oxide* the most important salts are the nitrate, $Hg(NO_3)_2 + 8Aq$; the sulphate, $HgSO_4$, which is employed in the manufacture of corrosive sublimate; and the basic sulphate, $HgSO_4,2HgO$, which is of a yellow colour, and is known as *Turpeth Mineral*.

The haloid salts of mercury correspond in their composition to the oxides. Of the most important of these—the chlorides—there are the subchloride, Hg_2Cl_2, well known as Calomel (q.v.), and the chloride, $HgCl_2$, or corrosive sublimate.

The *chloride*, $HgCl_2$, when crystallised from a watery solution occurs in long white glistening prisms; but when obtained by sublimation it occurs in white transparent heavy masses, which have a crystalline fracture, and chink with a peculiar metallic sound against the sides of the bottle in which they are contained. This salt melts at 509° F., and volatilises unchanged at about 570°. It has an acrid metallic taste. It is soluble in sixteen parts of cold, and in less than three parts of boiling water, and dissolves very freely in alcohol and in ether. Corrosive sublimate enters into combination with the alkaline chlorides, forming numerous distinct compounds. (A double chloride of ammonium and mercury, represented by the formula $CH_4NCl,HgCl_2 + Aq$, has been long known as *sal alembroth*.) It combines with oxide of mercury in various proportions, forming a class of compounds of great interest in theoretical chemistry, termed *oxychlorides of mercury*. On adding a solution of corrosive sublimate to a solution of ammonia in excess, a compound, which from its physical characters is termed *white precipitate*, is thrown down, the composition of which is $HgN_2H_6Cl_2$. Chloride of mercury coagulates albumen, and combines with the albuminous tissues generally, forming sparingly soluble compounds. Hence, in cases of poisoning with the salt, the white of raw eggs is the best antidote; and for the same reason corrosive sublimate is a powerful antiseptic, and is employed to preserve anatomical preparations.

Amongst the most important tests for this substance, which is not unfrequently used as a poison, may be mentioned (1) iodide of potassium, which, when added to a crystal or to a watery solution of chloride of mercury, gives rise to the formation of

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a bright scarlet iodide of mercury. (2) The galvanic test, which may be applied in various ways, of which the simplest is the 'guinea and key test,' devised by Wollaston. He placed a drop of the fluid suspected to contain corrosive sublimate on a guinea, and simultaneously touched it and the surface of the guinea with an iron key; metallic mercury was deposited on the gold in a bright silvery stain. (3) Precipitation on copper, and reduction. To apply this test we acidulate the suspected fluid with a few drops of hydrochloric acid, and introduce a little fine copper gauze, which soon becomes coated with mercury. On heating the gauze in a reduction tube the mercury is obtained in well-defined globules.

With iodine and bromine mercury forms two iodides and bromides, corresponding in composition to the chlorides. Both the iodides are used in medicine; the bromides are of no practical importance. The *subiodide*, Hg_2I, is a green powder formed by triturating 5 parts of iodine with 8 of mercury, and is of far less interest than the *iodide*, HgI, which is most simply obtained by precipitating a solution of corrosive sublimate by a solution of iodide of potassium. The precipitate is at first salmon-coloured, but soon changes into a brilliant scarlet crystalline deposit.

Sulphur forms two compounds with mercury—viz. a subsulphide, Hg_2S, a black powder of little importance, and a sulphide, HgS, which occurs naturally as Cinnabar (q.v.). *Sulphide of mercury* is thrown down as a black precipitate by passing sulphuretted hydrogen through a solution of a per-salt of mercury (corrosive sublimate, for example). When dried and sublimed in vessels from which the air is excluded, it assumes its ordinary red colour. The well-known pigment *vermilion* is sulphide of mercury, and is sometimes obtained from pure cinnabar, but is more frequently an artificial product.

Mercury unites with most metals to form Amalgams (q.v.), several of which are employed in the arts. Of the numerous organic compounds of mercury it is unnecessary to mention more than the Fulminate (q.v.) and the cyanide, HgCy, which may be prepared by dissolving the red oxide of mercury in hydrocyanic acid, and is the best source from which to obtain cyanogen.

The uses of mercury are so numerous that a very brief allusion to the most important of these must suffice. It is employed extensively in the extraction of gold and silver from their ores by the process of amalgamation. Its amalgams have been largely employed in the processes of silvering and gilding, and some (as those of copper and cadmium) are employed by the dentist for stopping teeth. It is indispensable in the construction of philosophical instruments, and in the laboratory in the form of the mercurial bath, &c. It is the source of the valuable pigment vermilion. The use of its chloride in anatomical preparations has been already noticed; it is similarly found that wood, cordage, and canvas, if *soaked* in a solution of this salt (1 part to 60 or 80 of water), are better able to resist decay when exposed to the combined destructive influence of air and moisture.

MEDICINAL USES OF MERCURY AND MERCURIALS.—Metallic mercury is used in medicine in a state of very fine division in the form of gray powder, blue pill, mercurial ointment, and other preparations. It is also used as mercurous and mercuric oxides and salts. As with other metals, the mercurial preparations have a local action and an action after absorption into the blood. The intensity of the local action varies, however, with the individual preparation; the persalts being soluble in water, and hence capable of precipitating albumen at once, are very irritating, while the mercurous salts and uncombined mercury, being insoluble in water, exert an effect only in so far as they are dissolved in the secretions. These differences in local action have a very great influence in determining their applications in medicine.

Locally, the various ointments, liniments, and plasters are used as stimulants, astringents, antiseptics, and parasiticides, the persalts are used as antiseptic lotions, while the protosalts are little employed locally, except Calomel (q.v.) in powder.

Absorption of mercurial preparations from the intestinal canal or skin takes place very readily, and in an hour or less the mercury may be detected in most of the secretions. After absorption into the blood all the preparations have the same action. In minute doses they act as alteratives, improving nutrition. In larger doses, such as are ordinarily used, they also exert profound alterative effects; but care must be exercised in their administration, otherwise symptoms of chronic poisoning are apt to ensue. These consist in excessive salivation, inflammation of the mouth and gums, and dyspepsia, while in severer cases caries of bone, nervous symptoms, a watery condition of the blood, albuminuria, cachexia, and other serious complications may occur. The mercurial preparations are given internally in syphilis, in serous inflammations, and in dropsy as diuretics. Certain of them, such as gray powder, blue pill, and calomel, are used as purgatives and as intestinal antiseptics.

The doses of the different preparations vary greatly, those of the persalts being very much smaller than in the case of the other preparations. Some persons are peculiarly susceptible to the action of mercurials, and show symptoms of chronic poisoning after very small amounts.

With regard to acute mercurial poisoning, this is due to irritation of the intestinal canal, and is only seen with the soluble salts when taken in overdoses. The perchloride (corrosive sublimate) has been most frequently employed for the purpose of poisoning. The symptoms come on immediately, with a burning pain in the throat and violent pain in the abdomen, with severe vomiting and purging. There is always a good deal of collapse. Albumen, in the form of white of egg, is the best antidote.

Mercury, DOG'S (*Mercurialis*), a genus of plants of the natural order Euphorbiaceæ. The Common Dog's Mercury (*M. perennis*) is very common in woods and shady places in Britain. It has a perfectly simple stem, about a foot high, with rough ovate leaves, and axillary loose spikes of greenish flowers. It turns a glaucous black colour in drying, and the root contains two colouring substances, one blue and the other carmine. It is very poisonous. The mercury which some old writers mention as a potherb is not this plant, but English Mercury, or Wild Spinach (*Chenopodium bonus-Henricus*). Annual Dog's Mercury (*M. annua*) is a much rarer British plant, and less poisonous. The leaves are indeed eaten in Germany as spinach. A half-shrubby species (*M. tomentosa*), found in the countries near the Mediterranean, has enjoyed an extraordinary reputation from ancient times; the absurd belief mentioned by Pliny being still retained, that if a woman after conception drink the juice of the male plant she will give birth to a boy, and if of the female plant her offspring will be a girl.

Mercy, SISTERS OF. See SISTERHOODS.

Mer de Glace. See ALPS, GLACIER.

Meredith, GEORGE, novelist and poet, was born in Hampshire, 12th February 1828, and made his first appearance as a poet with 'Chillianwallah' in *Chambers's Journal* for July 1849. This was followed in 1851 by a little volume of *Poems*, and in

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1855 by *The Shaving of Shagpat: an Arabian Entertainment*, a highly original tale, in burlesque imitation of the manner of the Eastern story-teller. It shows a rich and brilliant imagination, and abounds in passages of tender feeling as well as of boisterous humour, but the incidents are involved and the machinery complicated, and reading is also made difficult by tantalising suggestions of hidden meanings which constantly elude one's grasp. In 1857 appeared *Farina: a Legend of Cologne*, a short story, reflecting the influence of German romance, which it partly imitates and partly parodies. The series of Mr Meredith's greater and more characteristic works began in 1859 with *The Ordeal of Richard Feverel: A History of a Father and a Son*, a tragic romance, dealing with the larger problems of education, especially in its ethical aspects. The novel of *Evan Harrington*, an amusing comedy of social ambitions, followed in 1861. *Modern Love, and Poems of the English Roadside, with Poems and Ballads*, was published in 1862, 'Modern Love' being the title of a sequence of fifty sonnet-like poems which tell their story in a somewhat dark and fragmentary manner, but with great truth of observation and strength of pathos. *Emilia in England* (1864), now known as *Sandra Belloni*, has for its subject one of Meredith's most fascinating and original characters; it is continued in *Vittoria* (1866), the scene of which is laid in Italy at the time of the political risings of 1848. In 1865 had appeared *Rhoda Fleming*, like *Richard Feverel* a tragedy; the romantic *Adventures of Harry Richmond* followed in 1871. *Beauchamp's Career* (1875) is perhaps the most perfectly constructed of all the series. *The Egoist* (1879) is a searching and remorseless study of a single aspect of refined selfishness. *The Tragic Comedians* (1881), originally published in the *Fortnightly Review*, is a somewhat close rendering of the well-known painful story of Lassalle's tragic end, founded upon the reminiscences of the Countess Racowitza. *Diana of the Crossways* (1885), also based on actual history, is by general consent the most charming of Mr Meredith's novels. A new novel, entitled *One of our Conquerors*, was begun in the *Fortnightly Review* in October 1890. Mr Meredith's recent poetry is to be read in three small volumes entitled *Poems and Lyrics of the Joy of Earth* (1883), *Ballads and Poems of Tragic Life* (1887), and *A Reading of Earth* (1888).

Though it be admitted that Meredith is the foremost novelist of the day, and one of the most invigorating and stimulative thinkers of his generation, it can by no means be said that he is the most widely read, or that the voice of the great public has as yet been unanimously given in his favour. This distinction, however, he has, that 'among the crowd of persons of taste and understanding who agree to crown Meredith a royal writer, his most resolute partisans are those of his own household—journalists, poets, and novelists, students of the art of fiction and practitioners of the noble English tongue.' Among the elements of his power may be enumerated his wide, accurate, and sympathetic observation both of nature and of life, his inventive resource, his analytic and synthetic power, and his mastery of words. His descriptions of scenery are varied, vivid, and full of poetry, his delineations of phases of feeling, and especially of tender feeling, those of a master. Few writers have created so many characters of ideal beauty, who are at the same time so thoroughly human and marked by the strongest individuality—real, breathing, talking personalities, whom the reader feels it a joy to have known. Among the 'defects of his qualities' may be mentioned a certain intricacy of plot, or rather perhaps want of clearness in working it out, arising from an exaggerated reticence; also a frequent over-elaboration of style and strainedness of wit that fatigues rather than exhilarates. And, though he is never 'sensational,' there is often a certain disregard of probability in the situations he invents. It is believed that Mr Meredith is, for the present at least, more extensively read by men than by women; and this, if a fact, may perhaps be partly accounted for by the purpose which he has so deliberately expressed, and so consistently carried out, of bringing philosophy into the domain of fiction. Much of his writing deals more or less directly, in a serious manner, with the most important problems of politics, sociology, and ethics. It is in his poetry that his deepest views of life really find their directest and most elementary expression. There is a study by Le Gallienne, *George Meredith: some Characteristics*, with a bibliography by John Lane (1890).

Merganser (*Mergus*), a genus of birds of the family Anatidæ, having a long, rather slender, straight bill hooked at the tip and notched at the edges. The genus embraces six species, nearly all inhabitants of the seas and coasts, and distributed over the northern regions of the Old and New World, and in Brazil and the Auckland Islands. The Goosander (q.v.) is the largest and best-known British species. The Red-breasted Merganser (*M. serrator*) is resident in Scotland, where it breeds not only on the coasts of Ross, Sutherland, and the Hebrides, where it is abundant, but also on inland lochs and rivers. Its migrations extend southward to the lakes of Algeria and to Egypt. The Hooded Merganser (*M. cucullatus*), a smaller species, is a very rare visitor of Britain. It is found in North America, from the St Lawrence to Alaska, where it migrates as far south as Mexico, Cuba, Bermudas, and the Carolinas. The Nun or Smew (*M. albellus*) is a smaller species, passing the summer in the northern parts of the Old and New World, and ranging in winter as far south as India. Another species (*M. australis*) has as yet been found only in the Auckland Islands.

Mergui, a seaport of Burma, on an island in the Tenasserim River, 2 miles from its mouth, with a harbour admitting vessels drawing 18 feet of water. Its trade is worth altogether close upon £100,000 a year. Exports, rice, timber, dried fish; imports, cotton goods, silk, and tea. Pop. 8633. —The *district* of Mergui, 200 miles long by 40 wide, is the southernmost in Burma. Area, 7810 sq. m.; pop. (1881) 56,559.

Mergui Archipelago, a group of islands in the Gulf of Bengal, lying off the southern provinces of Burma; they are mountainous, some rising to 3000 feet, of picturesque beauty, and sparsely inhabited by a race called the Selungs, who barter edible birds'-nests with the Burmese and Malays for rice and spirits. Caoutchouc abounds. Snakes and tigers, rhinoceros, deer, &c. are plentiful.

Mer'ida (anc. *Augusta Emerita*), a decayed town of Spain, on the right bank of the Guadiana, 36 miles by rail E. of Badajoz. It is remarkable for its Roman remains, which include a bridge of 81 arches, 2575 feet long and 26 feet broad, erected by Trajan; the ruins of half a dozen temples, of an aqueduct, a circus, a theatre, a naumachia, a castle, and the Arch of Santiago, 44 feet high, built by Trajan. There is also an old Moorish palace. Merida was built in 23 B.C., and flourished in great splendour as the capital of Lusitania. In 713 it was taken by the Moors, who lost it to the Spaniards in 1229. Pop. 7390.

Merida, (1) capital of the Mexican state of Yucatan, is situated on a barren plain, 25 miles S. of Progreso, on the Gulf of Mexico, and 95 miles

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NE. of Campeachy. It occupies the site of a former native city, and was founded by the Spaniards in 1542. Merida has a cathedral and thirteen churches, a university, seminary, girls' high school, and conservatory of music, an antiquarian museum, a public library, hospital, almshouse, and foundling asylum. Its trade is not extensive. Pop. 32,000.—(2) A town of Venezuela, capital of Los Andes state, lies 5290 feet above sea-level, at the foot of the Sierra Nevada de Merida, and 70 miles S. of the lake of Maracaybo. Founded in 1558, it was almost wholly destroyed by an earthquake in 1812. It is the seat of a bishop, contains a university and several higher schools, and has manufactures of carpets and woollen and cotton stuffs. Pop. 10,750.

Meriden, a city of Connecticut, 19 miles by rail N. by E. of New Haven, with a number of manufactories of metal wares, cutlery, firearms, woollens, &c. Meriden contains the state reform school. Pop. (1880) 15,540; (1890) 21,230.

Meridian (Lat. *meridies*, 'mid-day'), the name given to the great circle of the celestial sphere which passes through both poles of the heavens, and also through the zenith and nadir of any place on the earth's surface. Every place on the earth's surface has consequently its own meridian. The meridian is divided by the polar axis into two equal portions, which stretch from pole to pole, one on each side of the earth. It is mid-day at any place on the earth's surface when the centre of the sun comes upon the meridian of that place; at the same instant it is mid-day at all places under the same half of that meridian, and midnight at all places under the opposite half. All places under the same meridian have therefore the same longitude (see LATITUDE AND LONGITUDE, where the question of the First Meridian is discussed). Stars attain their greatest altitude when they come upon the meridian; the same thing is true approximately of the sun and planets; and as at this point the effect of refraction upon these bodies is at a minimum, and their apparent motion is also more uniform, astronomers prefer to make their observations when the body is on the meridian. The instruments used for this purpose are called *meridian circles*. See MURAL CIRCLE.

Meridian Measurement.—Two stations, having nearly the same longitude, are chosen; their latitude and longitude are accurately determined (the error of a second in latitude introduces a considerable error into the result), and the direction of the meridian to be measured ascertained; then a base line is measured with the greatest accuracy, as an error here generally becomes increased at every subsequent step; and then, by the method known as Triangulation (q.v.), the length of the arc of the meridian contained between the parallels of latitude of the two stations is ascertained. As the previously found latitudes of its two extremities give the number of degrees it contains, the average length of a degree of this arc can be at once determined. This operation of meridian measurement has been performed at different times on a great many arcs lying between 68° N. lat. and 38° S. lat., and the results show a steady though irregular increase in the length of the degree of latitude as the latitude increases. On the supposition that this law of increase holds good to the poles, the length of every tenth degree of latitude in English feet is as follows:

Degree of Latitude.	Length of Degree in English Feet.	Degree of Latitude.	Length of Degree in English Feet.
0°	362,732	50°	364,862
10°	362,843	60°	365,454
20°	363,158	70°	365,937
30°	363,641	80°	366,252
40°	364,233	90°	366,361

This result shows that the earth is not spherical, as in that case the length of all degrees of latitude would be alike, but of spheroidal form—its curvature becomes less as we go from the extremity of its greater or equatorial diameter to the pole. See EARTH.

Meridian, capital of Lauderdale county, Mississippi, 135 miles by rail N. by W. of Mobile, contains a foundry and machine-shop, a cotton factory, and manufactories of blinds and sashes, furniture, &c. Pop. (1890) 10,889.

Mérimée, PROSPER, a great French writer, was born at Paris, 28th September 1803, the son of a well-known painter. He was educated at the Collége Charlemagne, and tried law, but soon abandoned it. He was in Spain during the revolution of 1830, and after his return became attached to the government, and held office successively in the ministry of Marine, of Commerce, and of the Interior, becoming finally Inspector of Historical Documents, in which capacity he visited the south and west of France, Auvergne, and Corsica. He had been long an intimate friend of the Countess Montijo, mother of the Empress Eugénie, and consequently enjoyed the closest intimacy with the imperial family at the Tuileries, Compiègne, and Biarritz, yet without surrendering his independence of spirit and frankness of speech. Admitted to the Academy in 1844, he became a senator in 1853, and in 1858 president of the committee for reorganising the Bibliothèque Impériale. His last years were clouded by ill-health and melancholy, and the misfortunes of his country and the downfall of the imperial house hastened on his death, at Cannes, 23d September 1870.

Mérimée began his career as a writer at twenty-two by an audacious literary *espiéglerie*, entitled *Théâtre de Clara Gazul*, a collection of Spanish plays of singular maturity, represented as translated by Joseph L'Estrange, with his own portrait in female dress as frontispiece. A volume of pretended translations of Illyrian folk-songs, by an imaginary Hyacinthe Maglanovitch, followed in 1827, under the title *Guzla*. His more important works embrace novels and short stories, archæological and historical dissertations, and travels, all of which display wide and exact learning, keen observation, strong intellectual grasp, grave irony and real humour, and withal a style that attains an exquisiteness of perfection rare even among the best French writers. Ever the refined and elegant scholar, he wrote, rather than affected to write, as a dilettante—'le *gentleman* auteur' as he was styled by his own countrymen. Of his more erudite works it may here be enough to name his *Histoire de Don Pèdre I., Roi de Castille* (1848; Eng. trans. 1849); *Études sur l'Histoire Romaine* (1844); *Les faux Démétrius* (1852); *Monuments historiques* (1843); and *Mélanges historiques et littéraires* (1855). But his greatest work is his tales, about twenty in number, some of which are among the rarest masterpieces of the story-teller's art: *Colomba*, *Mateo Falcone*, *Carmen*, *La Venus d'Ille*, *Lokis*, *Arsène Guillot*, *La Chambre Bleue*, and *L'Abbé Aubain*. One of the most remarkable merits of some of these stories, as *La Venus d'Ille* and *Lokis*, is the dexterous manner in which an uncanny superstition is turned to artistic use.

Mérimée's character remains somewhat of an enigma, with its outward mask of cynicism, its inward capacity for the most tender and devoted friendship, its longing for the love of little children. In his constant struggle against impulse and enthusiasm he succeeded, but, as he himself says of Saint-Clair in the *Vase Étrusque*, the victory cost him dear. Few lives have been more solitary and unhappy than Mérimée's, at once from a

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paralysing distrust of himself and of others, and from the constitutional melancholy of the sceptic to whom the world is only a series of incomprehensible and fleeting images, and who mistrusts life and death alike. He was one of the few men who have drawn their unbelief from mother and father alike. No great writer has left a more remarkable monument than the famous *Lettres à une Inconnue* (1873; Eng. trans., edited by R. H. Stoddard in Scribner's 'Bric-a-Brac' series), the revelation of a heart throughout an acquaintance, first of love, then of friendship, extending over thirty years. Here we find no selfish cynic, but a man gracious, affectionate, delicate, touched with poetry despite his scepticism, faithful and loyal unto death—his last words were written but two hours before the end. The unknown lady's actual existence has been questioned, and she has been doubtfully identified with the Countess Lise Przedrzerska, sister of the Marquis de Noailles. What professed to be her letters in reply were published in 1888, but without any explanation being offered; an English translation of these followed in two volumes in 1889. Only less interesting than the first series are the *Lettres à une autre Inconnue* (1875), and the Letters to Panizzi (edited by Louis Fagan, 2 vols. 1881), full of lively gossip and clever criticism.

See the Studies by Tamisier (Mars. 1875) and Haussonville (1888); also Tourneaux, *Prosper Mérimée, ses Portraits, ses Dessins*, &c. (1879).

Merino (Span.), an important breed of Sheep (q.v.). See also WOOLLEN MANUFACTURE.

Merion'eth, a triangular county of Wales, with a maximum length and breadth of 45 miles by 30, a seaboard of 38 miles, and an area of 602 sq. m., or 385,219 acres, is bounded on the N. by the counties of Carnarvon and Denbigh, E. and S. by Montgomeryshire and the river Dovey, and W. by Cardigan Bay. Pop. (1801) 27,506; (1841) 39,332; (1881) 52,038. Cliffs alternating with low-lying sands skirt the coast, which at some distance out to sea is fringed by dangerous sandbanks. Inland, the surface, although nowhere attaining such an altitude as that of Carnarvonshire, is rugged and mountainous in the extreme, interspersed in places with picturesque valleys, lakes, and waterfalls. Aran Mowddy (2970 feet), Cader Idris (q.v., 2914), and Aran Benllyn (2902) are the highest peaks; Bala the largest lake; whilst of rivers the principal are the Dee, which flows north-east, and the Dovey and Mawddach, which reach the sea after a south-west course. The soil generally is poor, and large tracts are unfit for profitable cultivation, the total extent of land in crop in 1889 only amounting to 160,817 acres, of which 128,021 acres were in permanent pasture. Great numbers of sheep are bred, and flannels and woollens to some extent manufactured, but the principal wealth of the county arises from its mineral products. Slate and limestone are largely quarried, much manganese ore is produced, and from mines in the vicinity of Dolgelly and Bala 3890 oz. of gold of the value of £13,227 were in 1889 obtained. Merioneth, which contains no municipal boroughs, is divided into five hundreds, and thirty-three civil parishes, partly in the diocese of Bangor, and partly in that of St Asaph. For judicial purposes it is in the North Wales circuit, Dolgelly being the assize town, and it sends one representative to the House of Commons. The County Council numbers fifty-six members, and the principal towns, other than the foregoing, are Bala, Barmouth, Corwen, Festiniog, Harlech, and Towyn.

Meristem, the formative tissue of plants, is distinguished from the permanent tissues by the power its cells have of dividing and forming new cells. Meristem forms the tissue of embryo plants, and of apexes of stems and roots.

Merivale, JOHN HERMAN, an English scholar and translator, was born at Exeter in 1779, the grandson of Samuel Merivale (1715–71), a worthy Presbyterian minister at Tavistock. He was sent to St John's College, Cambridge, and was called to the bar in 1805. He contributed largely to Bland's *Collections from the Greek Anthology* (1813), and brought out a second edition himself in 1833. From 1831 to his death in 1844 he held the office of Commissioner of Bankruptcy. Works of no little merit were his *Poems, Original and Translated* (1841), and *Minor Poems of Schiller* (1844).—CHARLES, son of the preceding, was born in 1808, and educated at Harrow, Haileybury, and St John's College, Cambridge, where he took his degree in 1830, and became in due course fellow and tutor. He was successively select preacher at Cambridge (1838–40) and at Whitehall (1839–41), Hulsean lecturer (1861), and Boyle lecturer (1864–65). From 1848 to 1869 rector of Lawford in Essex, he was chaplain to the Speaker from 1863 to 1869, when he was appointed dean of Ely. His chief works are the *Fall of the Roman Republic* (1853), a brilliant sketch, marred only by its over-indulgence to imperialism, the sole fault of his admirably learned and eloquent *History of the Romans under the Empire* (7 vols. 1859–62). Later books are a serviceable *General History of Rome* (1875), *Early Church History* (1879), and *The Contrast between Pagan and Christian Society* (1880).—Another son, HERMAN, born in 1806, was educated at Harrow and Trinity College, Oxford, elected Fellow of Balliol, called to the bar in 1832, and appointed professor of Political Economy at Oxford in 1837, and, later, permanent Under-secretary of State first for the colonies, next for India. In 1859 he was made C.B. He died on February 8, 1874.—His son, HERMAN CHARLES, born in 1839, has written a number of successful plays, including *Forget-Me-Not*, *The Butler* and *The Don*, and *The Master of Ravenswood*. Besides a novel, *Faucit of Balliol* (1882; in its stage form, *The Cynic*), he has published *The White Pilgrim and other Poems* (1883), and other works. See the privately printed *Family Memorials*, compiled by Anna W. Merivale (1884).

Merle D'Aubigné. See D'AUBIGNÉ.

Merlin, the name of an ancient British prophet and magician, who is supposed to have flourished during the decline of the native British power in its contest with the Saxon invaders. The prophetic child Ambrosius first mentioned by Nennius in his *Historia Britonum* was confounded with Ambrosius Aurelianus, the conqueror of Vortigern, and subsequently the resulting Merlin Emerys or Ambrosius was confounded with the Merlin called Silvestris or Caledonius. It is as the subject of one of the cycle of Arthurian romances that Merlin's name has survived. The Cambrian Merlin is said by Geoffrey of Monmouth, in his *Historia Britonum* and *Vita Merlini*, to have lived in the 5th century, to have sprung from the intercourse of a demon with a Welsh princess, to have been rescued from his malignant destiny by baptism, and to have displayed the possession of miraculous powers from infancy. The adventures of Merlin were taken, with additions from Armorican and other sources, from the Latin of Geoffrey, and made popular in the French language by Robert Wace and Robert de Borron. Henry Lonelich's English verse translation is in the library of Corpus Christi College, Cambridge. The analysis of the romance of Merlin in Ellis's *Specimens of Early English Metrical Romances* was made from the MS. in Lincoln's Inn Library. There is a MS. in the Advocates' Library,

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Edinburgh, and one in Bishop Percy's folio MS. (printed in 1867). The prose romance is longer and more important than the metrical one. *Merlin, Roman en Prose du XIII^e Siècle*, was published by the Société des Anciens Textes Français in 1886, and the Early English Text Society published under the editorship of the present writer in 1865–69 *Merlin, or the Early History of King Arthur about 1450–60*, printed from the MS. in the Cambridge University Library. Merlin is frequently alluded to by our older poets, especially by Spenser, and his story occupies a prominent position in Tennyson's *Idylls of the King*. A collection of prophecies attributed to Merlin appeared in French (Paris, 1498), in English (Lond. 1529 and 1533), and in Latin (Venice, 1554); and their existence is traceable at least as far back as the middle of the 14th century. The Strathclyde, or—if we may be allowed an expression which anticipates history—the *Scottish* Merlin, called Merlin the Wyllt, or Merlin Caledonius, is placed in the 6th century, and appears as a contemporary of St Kentigern, Bishop of Glasgow. His grave is still shown at Drummelzier on the Tweed, where, in attempting to escape across the river from a band of hostile rustics, he was impaled on a hidden stake. A metrical life of him in Latin, extending to more than 1500 lines, professedly based on Armoric materials, and incorrectly ascribed to Geoffrey of Monmouth, was published by the Roxburghe Club in 1833. His prophecies—published at Edinburgh in 1615—contain those ascribed to the Welsh Merlin.

Merlin. See FALCON.

Mermaids and **Mermen,** in the popular folklore of Europe, a class of beings more or less like men, living in the sea, but in some circumstances capable of social relationships with men and women. The typical mermaid has the head and body of a lovely woman to the waist, ending in the tail of a fish with fins and scales. She has long and beautiful hair, and is often seen above the surface of the water, combing it with one hand while in the other she holds a mirror. She often discloses what is about to happen, and not seldom gives supernatural knowledge and powers to a favoured mortal—a thing in perfect keeping with primitive notions of sorcery, which easily attributed exceptional powers to beautiful women, as Lilith and Circe. Again, she sometimes exercises a special guardianship over an individual, and avenges his wrongs; but her relation to man most often brings with it disaster. There are many stories of mermaids who have fallen in love with men, or been detained through the possession of the skin which they had stripped to dance on the shore, and who have been faithful wives and mothers until they found an opportunity to return to the sea. And there are examples of the converse case of a mermaid falling in love with a man and enticing him to go and live with her under the sea, as well as of a merman bewitching and carrying off a mortal maiden.

Such are the principal forms of mermaid stories found everywhere, with more or less artistic elaboration. The Danish *Hafmand* or *Maremind*, the Irish *merrow* or *merruach*, the Breton *Marie-Morgan*, the Russian *rusalka* or stream-fairy and *vodyany* or water-sprite, some forms of the Teutonic *nixies*, and the enchanting Sirens of classical mythology have all close affinities with each other in the dangers they bring to men, the beauty and joyousness of their lives, and yet the gloom of sadness that overhangs them. In their malignant aspect they touch the general doctrine of Demonology (q.v.), and may be explained on an animistic theory of its origin. To the beauty of the conception and the elaborations of which it is capable in the popular imagination we owe some of the loveliest of our folk-tales as well as such delightful artistic tales as *Undine* and many fine poems of the ages of literary culture. One of the most detailed stories of this class is that of Melusine (q.v.). The mermaid had a firm hold of the imagination of our fathers, and, besides the witness of heraldry, we have stories supported by excellent evidence of their appearance and capture. One caught at Edam in 1403 was carried to Haarlem and kept there many years. She learned to spin and showed a becoming reverence for the cross. See Baring-Gould's *Popular Myths of the Middle Ages*, and Sébillot's *Contes des Marins* (1882).

Mermaid's Purse, the popular name of the egg-case of the skate (or of some other cartilaginous fish), which is often cast up empty on the shore.—*Mermaid's Gloves* is a very common British sponge, *Chalina oculata*.

Merodach. See BABYLONIA, Vol. I. p. 637.

Meroë. See ETHIOPIA.

Meropidæ. See BEE-EATER.

Merovingians, or MERWINGS, the first dynasty of Frankish kings in Gaul. The name is derived from Merwig or Merovech, king of the western or Salian Franks from 448 to 457. His grandson Clovis (q.v.) established the fortunes of the dynasty which gave way to the Carlovingians (q.v.) in 752. See FRANCE, FRANKS.

Merrimac, a river rising among the White Mountains of New Hampshire, flowing south into Massachusetts, and falling into the Atlantic Ocean near Newburyport, after a course of 150 miles. It has numerous falls, affording immense water-power. The principal manufacturing towns on its banks are Manchester, Nashua, and Concord in New Hampshire, and Lowell and Lawrence in Massachusetts. It is navigable to Haverhill.

Merseburg, a town of Prussian Saxony, on the Saale, 8 miles S. of Halle. Its Domkirche is a four-towered pile, with Romanesque choir (1042), transept (*circa* 1274), and 16th-century nave—the whole restored in 1884–86. The organ (1666) has 4000 pipes; and there is a very early bronze effigy in low relief of Rudolph of Swabia, who here was defeated and slain by Henry IV. in 1080. The castle, a picturesque edifice, mostly of the 15th century, was once the bishop's palace, and afterwards (1656–1738) the residence of the dukes of Sachsen-Merseburg. Beer, iron, paper, &c. are manufactured. Pop. (1875) 13,664; (1885) 16,828. Henry the Fowler in 934 gained his great victory over the Hungarians near Merseburg, which suffered much in the Peasants' War and in the Thirty Years' War.

Mersenne, MARIN, a constant friend of Descartes, was born in 1588, and died at Paris in 1648. He was a fellow-student of Descartes at the Jesuit college of La Flèche, and took the habit of a Minim Friar in 1611; his life thereafter was spent in study, teaching in convent-schools, and travel. He did valiant battle with numerous clerical controversialists on behalf of the orthodoxy of the philosophy of Descartes, and wrote vigorously against atheists and other unbelievers. His profound knowledge of mathematics is seen in a number of books, and in his *Harmonie Universelle* (1636), an invaluable contribution to the science of music.

Mersey, an important river of England, separates, in its lower course, the counties of Chester and Lancaster, and has its origin in the junction of the Etherow and Goyt, on the borders of Derbyshire, east of Stockport. It flows in a west-south-west direction, and is joined on the right

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by the Irwell 6 miles below Manchester, from where it was made navigable to Liverpool for large vessels in the year 1720, and has had great influence on the subsequent progress of the two towns. Besides the Irwell the chief affluents are the Bollin and the Weaver from Cheshire. At its junction with the Weaver the Mersey expands into a wide estuary which forms the Liverpool channel. The estuary is about 16 miles long and from 1 to 3 miles broad; opposite Liverpool it is a mile and a quarter in width, with a considerable depth at low-water. In this estuary on the Cheshire side is the entrance to the Manchester Ship-canal. The estuary is much obstructed by sandbanks, but the excellent system of pilotage in practice, combined with the skilful and admirable construction of the sea-walls, renders the navigation comparatively secure. Entire length, with the estuary, 70 miles. A tunnel connecting Liverpool and Birkenhead by railway carried beneath the estuary has been in successful operation since January 20, 1886. The alluvial meadows on the banks of the Mersey are famous for their fertility, and in recent years, by embanking the river at points where it overflowed after heavy rains, many thousands of acres of the most valuable land in the two counties have been reclaimed. The basin of the Mersey extends over an area of 1706 sq. m., which includes the larger portion of Lancashire and Cheshire.

Merthyr-Tydvil or **Tydfil** (so called from the martyrdom here of a Welsh princess of that name), a parliamentary borough and market-town of South Wales, on the confines of the counties of Glamorgan and Brecknock, 24 miles N. by W. of Cardiff, its port, and 178 W. of London. Pop. (1801) 7705; (1881) 48,861. Surrounded by lofty and bleak hills, the town stands on the banks of the river Taff, and is partly built on slag foundations, the refuse of mines in the vicinity. Its streets are for the most part narrow and irregularly built, and the public buildings of little architectural interest, but of late years—since the formation of a Local Board of Health in 1850—great improvements have been effected in the widening of thoroughfares, the supply of pure water, and the construction of effective sewage-works: previously all sanitary arrangements were entirely neglected, and as a result epidemics of great severity were of frequent occurrence. The civil government of the town (which extends over the outlying districts of Dowlais and Penydarran) is vested in a high constable, who is elected annually. The sole industries, upon which the whole population is more or less directly dependent, arise from the numerous collieries and iron and steel works in the vicinity; Merthyr being the centre of the Glamorganshire coalfield, and as such having excellent railway communication with all parts. With Aberdare it is noted for the excellence of its steam coal, and the quantity of iron and steel annually turned out from the great works of Dowlais, Cyfarthfa, and Plymouth is enormous. In 1816, and again in 1831, the town was the scene of severe riots, on the latter occasion the disturbance not being quelled by the military without a loss of twenty-three lives. For the parliamentary borough (1867), which embraces Aberdare and two other outlying districts, and in 1881 had a population of 91,373, two members are returned.

Merton, LOWER, a village of Surrey, 10 miles SW. of London by rail, stands on the Wandle, and has several factories. Only a fragment remains of the Augustinian priory (1115) in which the parliament met which passed, in 1235, the Statute of Merton (see LEGITIMATION). Here were educated Thomas Becket and Walter de Merton, Bishop of Rochester and Chancellor, who in 1264 founded Merton College, at Oxford. The church is mainly of the same date as the priory. Pop. of parish, 2480.

Meru, in Hindu Mythology, a fabulous mountain in the centre of the world, 80,000 leagues high. It is the most sacred of all mythical mountains, and the abode of Vishnu.

Merv, an oasis of Turkestan, lying between Bokhara and the north-eastern corner of Persia, 512 miles by rail (opened in July 1886) from the Caspian and 118 from the Oxus. The oasis consists of a district 60 miles long by 40 broad, watered by the river Murghab, grows wheat, sugar grass, cotton, and silk, has a hot, dry climate, and is inhabited by half a million (O'Donovan; the Russians say less than a quarter million) Tekke Turkomans. The people live scattered over the country. But there is an old citadel, Kaushid Khan Kala, and adjoining it a new Russian fort garrisoned by nearly 3000 men; on the opposite bank of the Murghab a new Russian town is growing up, several Armenian merchants having settled on the spot and monopolised the trade, worth about £150,000 a year. The men are clever workers in silver, and breed horses, camels, and sheep; the women weave silk and make carpets. Merv or Mouru is mentioned in the *Zend Avesta*. There Alexander the Great built a town. The oasis was held successively by the Parthians and the Arabs, who made the city of Merv capital of Khorassan. It was the seat of a Nestorian archbishop in the 5th century, and of a Greek archbishop in the 14th; and in the 8th it was the headquarters of Mokanna (q.v.), the 'Veiled Prophet of Khorassan.' Under the Seljuk Turks Merv enjoyed its period of greatest splendour, especially under Sultan Alp Arslan. It began to fall into ruin after being taken and sacked by the Mongols in 1221. From the Uzbegs it passed in 1510 to the Persians, who lost it in 1787 to the emir of Bokhara. In 1856 the Turkomans made themselves masters of the oasis; but they in turn submitted to the Russians in 1883, who built the railway from the Caspian to the Oxus, passing through the oasis. Merv occupies an important strategic position at the intersection of the routes Bokhara-Meshhed and Khiva-Herat.

See Marvin, *Merv* (1880); O'Donovan, *Merv Oasis* (2 vols. 1882); Lansdell, *Russian Central Asia* (1885), and *Russians at Merv and Herat* (1883).

Méryon, CHARLES, etcher, was born at Paris, the son of an English physician, in 1821, and died insane at Charenton Asylum, 13th February 1868. His sombre and imaginative etchings of streets and buildings in Paris are highly esteemed by connoisseurs, especially the 'Abside de Notre Dame,' 'Rue des Mauvais Garçons,' and 'Stryge.' See Wedmore in *Nineteenth Century* (1878) and *Art Journal* (1881), and Burty's monograph (1879).

Mesagna, a town in Southern Italy, 12 miles SW. of Brindisi, grows good olive-oil. Pop. 9601.

Mesembryaceæ, or FICOIDEÆ, a natural order of calycifloral dicotyledonous plants, comprising succulent shrubs, herbaceous perennials, and annuals with opposite leaves. In many species the latter are of curious and fantastic shape, especially in those of the typical genus Mesembryanthemum. The order contains sixteen genera and over 400 species, the larger number of the latter belonging to Mesembryanthemum. They are inhabitants of warm regions chiefly, most of them being found at the Cape of Good Hope and in the South Sea Islands. The typical genus is also the most important in regard to utility and beauty. It furnishes the Ice Plant (q.v.) of our gardens, and many other beautiful and curious

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species are to be met with in our greenhouses. *M. nodiflorum* is employed in the manufacture of Morocco leather, and furnishes abundance of alkali. The Kou of the Hottentots is *M. emarcidum*, the roots, stems, and leaves of which they collect and beat and twist together, and then ferment, for the purpose of chewing to allay thirst. If chewed immediately after fermentation it is narcotic and intoxicating. It is the Canna Root of the Cape colonists. The Hottentot's Fig (*M. edule*) is abundant on the sandy plains of the Cape of Good Hope, and the fruit is eaten when ripe. The leaves are eaten also when young and fresh, and when somewhat older are pickled in vinegar. The juice of the plant has some reputation as a cure for dysentery and thrush in children, and as an external application for burns. The fruit of *M. equilaterale* is named Pigs'-faces in Australia, and is eaten by the natives; that of *M. geniculiflorum* is ground into flour in Africa and made into bread, as is that of the Ice Plant. The Flower of Crete is the seed-vessel of *M. tripolium*, which in the rainy season expands in the form of a star, allowing the seeds to escape. The name should be spelled Mesembriaceæ, as it is from the Gr. *mesēmbria*, 'mid-day,' because the flowers bloom usually at mid-day.

Mesentery (Gr. *meson*, 'middle;' *enteron*, 'the intestine') is the broad fold of peritoneum (the great serous membrane of the abdomen) which attaches the intestines (strictly the small intestine; for special names have been given to the corresponding structure in connection with the different parts of the large intestine) posteriorly to the vertebral column. It serves to retain the intestines in their place, while it at the same time allows the necessary amount of movement, and it contains between its layers the blood-vessels and nerves which pass to them, the lacteal vessels, and mesenteric glands. These glands are 100 to 150 in number, and are about the size of an almond. They exert an organising action on the contents of the lacteals, the chyle being more abundant in fibrine and in corpuscles after it has passed through them. The only disease of any importance affecting these glands is Tubercle (q.v.), which, when extensively developed in them, is sometimes called *tabes mesenterica*.

Meshhed ('the place of martyrdom,' also spelt *Meshed* and *Mashhad*), the principal city of north-eastern Persia, the capital of Khorassan, and the centre of important trade routes. The city stands on a tributary of the Hari-Rud, 460 miles E. by N. from Teheran and 200 NW. of Herat, and has a beautiful appearance when seen from a distance. Above the walls, which are of great circuit, shine the gilded dome and minarets of one of the most splendid mosques of the East, that built above the tomb of Imam Riza, a follower of Ali, and the eighth imam of the Shiite sect. Meshhed is the sacred city of the Shiites, and is held in as much veneration by them as Mecca is by the Sunnite Moslems; it is visited every year by nearly 100,000 pilgrims. The city is bisected by a wide tree-shaded street, down the middle of which flows a muddy current between low stone walls. There is another handsome mosque, and several colleges and caravanserais. The people make excellent felt-rugs, carpets, swords, turquoise jewellery, velvet, and cotton and silk goods. Opium (£37,200), woollens and cottons, dried fruits, turquoises (£17,200) are exported to Russia, India, and Afghanistan, to the total value of £169,000. The imports consist of textiles, sugar, &c. from Russia (£110,400), textiles, &c. from Britain (£84,300), tea (£142,850), &c. from India (total, £184,600), and miscellaneous goods from Afghanistan (£17,300) and from Turkey (£16,000). The Transcaspian Railway *viâ* Merv is giving Russia the predominance in trade with Meshhed. The fixed population is about 50,000. Owing to its elevated situation (3055 feet), the city has a cold climate in winter; the summer temperature ranges from 76° to 92° F. Close by are the ruins of Tus, the old capital of Khorassan, where the celebrated poet Firdausi, Haroun-al-Raschid, and the Imam Riza were buried. See O'Donovan, *Merv Oasis* (1882), and J. Bassett, *Persia* (1886).

Meskoutin, or HAMMAM MESKOUTIN ('the Accursed Baths'), a place in Algeria, 48 miles (77 by rail) E. by N. of Constantine, with remarkable hot baths (203° F.), known to the Romans as *Aquæ Tibilitinæ*. They and the adjoining ferruginous and sulphureous springs (170°) are still used medicinally. The incrustations of carbonate of lime and clouds of steam, &c. give the region a very singular appearance.

Mesmer, FRIEDRICH ANTON or FRANZ, the founder of the doctrine of Animal Magnetism (q.v.), was born near Constance, 23d May 1734. He was bred for the priesthood at Dillingen and Ingolstadt, but took up the study of medicine at Vienna, and took his doctor's degree in 1766 with a treatise *De planetarum influxu*. About 1772 he began with a Jesuit, Hell, to investigate the curative powers of the magnet, and was led to adopt the opinion that there exists a power, similar to magnetism, which exercises an extraordinary influence on the human body. This he called animal magnetism, and published an account of his discovery, and of its medicinal value, in 1775. In 1778 he went to Paris, where he created a great sensation. His system obtained the support of members of the medical profession, as well as of others; but he refused an offer of an annual pension of 20,000 livres (about £800) to reveal his secret; and this, combined with other circumstances, gave rise to suspicion, and induced the government in 1785 to appoint a commission, composed of physicians and scientists (Bailly, Franklin, Lavoisier, &c.), whose report was unfavourable to him. He now fell into disrepute, and, after a visit to England, retired to Meersburg, in Switzerland, where he spent the rest of his life in complete obscurity. He died 5th March 1815. See his Life by J. Kerner (Frankf. 1856), and P. Anderson Graham's *Mesmer the Magnetiser* (1890).

Mesoderm. See EMBRYOLOGY.

Mesolonghi. See MISSOLONGHI.

Mesopotamia ('between the rivers'), the district between the rivers Tigris and Euphrates, extending from the foot of the Armenian mountains south-eastwards to near the neighbourhood of Bagdad. The name is the Greek equivalent of the old Aramaic (Syrian) Aram-Naharaim, and became current after Alexander's Asiatic conquests; the Arabs call the district El-Jezira ('the island'). It has an area of about 55,000 sq. m.; the surface is level and falls from an altitude of 1100 feet in the north-west to 160 feet in the south-east, where the alluvial region of Babylonia (Irak) begins. The soil is sandy, but, when well watered or, as it was in ancient times, well irrigated, it develops extraordinary fertility. Yet since the Turks (Seljuks) made themselves masters of the region (1515) it has fallen more and more a prey to barrenness and neglect. Having been in the possession successively of the Assyrians, Babylonians, Persians, Greeks, Romans, Arabs, and Turks, and many a time and oft the battle-ground between the armies of these mighty empires, its records are full of stirring events and great changes and vicissitudes. Amongst the cities of

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historic fame may be quoted Harran, Serug (Seruj), Apamea, Edessa, Nisibis, Nicephorium (Rakka), Hit (Is), Mardin, Mosul (Nineveh), Amid (Diarbekr), and Thapsacus. In biblical times this region was inhabited by prosperous Aramæan agriculturists. At the present time the population consists chiefly of semi-nomad Arabs and Kurds, who keep herds of camels, sheep, and goats, and grow wheat, barley, rice, millet, sesamum, besides cotton, tobacco, safflower, hemp, cucumbers, melons, and other fruits. There is little timber on the plains. Wild hogs, jackals, hyænas, foxes, and cheetahs, antelopes and gazelles, are common; but lions and wild asses, so numerous in antiquity, are now scarce. In summer excessive heat (up to 122° F.) prevails, whilst the winter is comparatively cool—the thermometer may go down to 14° F. A brief summary of the work of exploring ancient sites, and of sites still to be excavated, is given in the *Academy*, 12th June 1886. See articles on the empires and towns mentioned above; also TIGRIS, EUPHRATES, and works quoted there.

Mesozoa, a term applied by Van Beneden to a number of extremely simple animal parasites, found in cuttle-fishes, brittle-stars, and some worms. Their cells are in two layers, the inner forming reproductive elements; they have no mouth or gut, and are sometimes very like the larval forms (*planulæ*) of some jelly-fish and other stinging animals. The name refers to their apparent median position between the single-celled Protozoa and the many-celled Metazoa. See DICYEMIDÆ.

Mesozoic (Gr., 'middle-life'), a term introduced by Professor Phillips to designate the group of geological systems, the fossil remains of which differ equally from those of the Palæozoic ('ancient-life') and Cainozoic ('newer-life') eras. It is synonymous with the term Secondary, and includes the Triassic, Jurassic, and Cretaceous systems.

Mess (Fr. *mets*, Old Fr. *mes*, Ital. *messo*, 'a dish,' from Lat. *missum*, 'sent,' or 'served up') originally signified a dish or portion of food. In the British army and navy the men are divided into 'messes' of whatever number is most convenient for taking their meals together. Officers and sergeants also have their 'messes,' which, in addition to being 'common rooms' in which they take their meals, are much of the nature of clubs, having smoking, billiard, and reading rooms attached to them, and often libraries.

In the army each man, unless married, or for other reasons allowed to live out of mess, pays a daily rate of 5d. a day to his mess, which is managed by a non-commissioned officer under the supervision of an officer. For this sum he is provided with groceries, vegetables, puddings, and plates and mugs. A knife, fork, and spoon is part of his kit which he must always have with him. His rations (¾ lb. of meat, including bone, and 1 lb. of bread per day) are given him free, but are drawn in bulk for the whole mess, the meat rations being cooked together and only distributed at dinner, which is eaten in the barrack-room where usually the members of the mess live. Tea and breakfast are similarly served. The men's washing is also managed by messes, and charged in the monthly mess accounts. One of the mess is told off as cook each day. He cleans the room, sets the table, and carries up and divides the dinner, but the actual cooking is done by trained cooks. *Sergeants' Messes* are managed by one of themselves under a committee of sergeants supervised by an officer, the adjutant if possible. There is a small entrance fee (usually three days' pay) and a monthly subscription for newspapers, &c. Some furniture is provided by government, but kitchen and table requisites, carpets, pictures, &c. are purchased out of the mess funds.

Officers' Messes are very similar, but on a larger scale. Every officer on joining is charged an entrance fee of thirty days' pay towards the maintenance of the mess, and thirty days' difference of pay on promotion. Unless married or specially exempt, he must be a 'dining' member of the mess of his regiment—i.e. he pays the regulated price for his dinner whether he eats it or not; other meals, as well as wine, cigars, &c., are only charged if taken. All officers also pay a monthly subscription of two-thirds of a day's pay for single, and half that amount for married officers, towards keeping up the mess establishment, such as furniture, liveries, wages of servants, table-linen, &c. The only assistance received from government is £25 a year for each troop, battery, or company connected with the mess; but this is only at home and in some colonies. This sum was originally intended to allow each officer a glass of wine a day, but may be applied towards reducing the general expenses of the mess. The affairs of the mess are managed by a committee of officers presided over by the senior member. The usual cost of the meals is 2s. 4d. for dinner, without wine, 1s. for lunch, and 1s. for breakfast. The bills are paid monthly, and will generally amount to some £7 or £8, without wine, for each officer.

In the British navy there are in all ships as a rule, except in the smaller ones, four messes for officers: the ward-room, the gun-room, the engineers' mess, and the warrant-officers' mess. The ward-room includes all officers, below the captain (who messes by himself), who are above the rank of sub-lieutenant. The gun-room comprises the sub-lieutenants, midshipmen, cadets, junior assistant-paymasters, and clerks; the engineers' mess, all engineers not entitled to mess in the ward-room; the warrant-officers' mess, the gunner, boatswain, and carpenter. In troopships there is one general mess for all officers, naval and military, including the captain of the ship. The system of having one general mess has been tried in other ships, but it has been found impossible so far to arrange for a mess-place sufficiently large to allow of all the officers sitting down to their meals together. The separate mess-place for the engineer officers is, however, being gradually done away with, those engineers not entitled to mess in the ward-room messing in the gun-room. Among the ship's companies the chief petty-officers, first-class petty-officers, and the engine-room artificers have respectively their own mess-places, while the rest of the crew are divided off into messes, according to their numbers, the marines and stokers forming messes by themselves. Flag-officers and officers in command of ships can draw all their plate, glass, china, and linen from the dockyard, paying the Admiralty a percentage for the use of it. The officers of the other messes are supplied on commissioning with a complete set of mess-traps, linen, &c. free of charge, which they have afterwards to keep up at their own expense. All officers and men, admiral and second-class boy alike, are entitled to the same daily rations. Officers, however, are not compelled to take up their rations, but can take up as much or as little of it as they please, receiving instead a money allowance, which is paid into the mess-fund. The men, however, must take up two-thirds of their rations, but they can receive money in lieu of the remaining third. Rum is no longer served out to the officers, but the men still continue to receive their half-gill.

Messageries Maritimes, or in full, 'La Compagnie des Services Maritimes des Messageries,' a great French shipping company of Mar-

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seilles, its headquarters, trading with the Levant and Black Sea, with eastern Asia and Australia, by way of the Suez Canal, and with Spain and Algiers.

Messalina, VALERIA, the daughter of Marcus Valerius Messala Barbatus, and wife of the Roman emperor Claudius, a woman infamous for her avarice, her lust, and her atrocious cruelty. Taking advantage of the weakness and stupidity of the emperor, she played the harlot without restraint, and murdered all who murmured at her gilded shame. The best blood of Rome flowed at her pleasure: among her victims were the daughters of Germanicus and Drusus, Justus Catonius, M. Vinicius, Valerius Asiaticus, and her confederate Polybius. During a temporary absence of the emperor she went so far in open shamelessness as publicly to marry C. Silius, one of her favourites. The blinded emperor's eyes were at last opened by his freedman Narcissus, and he was persuaded to give orders for her execution. She was put to death by Euodus, a tribune of the guards, in the gardens of Lucullus, 48 A.D.

Messapians. See APULIA, INSCRIPTIONS.

Messengers, KING'S (QUEEN'S), officers employed by secretaries of state to convey valuable and confidential despatches at home and abroad.

Messenia, in ancient Greece, the western of the three peninsulas that project southwards from the Peloponnesus, was bounded on the E. by Laconia, and on the N. by Arcadia and Elis. It was composed chiefly of fertile plains, separated by mountain-chains and watered by the Pamisus and other streams, and yielded abundant corn and wine. The original Pelasgic inhabitants were conquered by the Dorians, but soon absorbed their conquerers and rose to great prosperity. This excited the envy of the Spartans, who waged two long wars (743–724 and 685–668) against the brave Messenians. Most of those who survived the second war emigrated to Sicily, where they took possession of Zancle, and changed its name to Messana, the present Messina. Those who submitted to Sparta were made helots; but they revolted and waged a third war of ten years' duration (from 464). The survivors settled in Naupaktos. After the battle of Leuctra (370) Epaminondas invited the descendants of the Messenians back to Greece, and they joyfully responded to his invitation. Their independence continued till the Roman conquest in 146 B.C. Messenia is the name of a nomarchy of the modern kingdom of Greece.

Messiah (Heb. *Mashiach*, equivalent to the Greek *Christos*, 'the Anointed') designates, in the Old Testament, the great Deliverer and Saviour, whom the Jews expected to be sent by God, not only to restore their country to the power and splendour which it exhibited in the days of David, but even, by compelling the Gentiles to acknowledge the supremacy of the theocratic people, to raise it to the summit of universal dominion. See BIBLE, Vol. II. p. 118; and for the New Testament Messiah, see BIBLE, p. 123, and CHRIST, and JESUS. See also JEWS, and MAHDI.

Messina, the second city of Sicily, stands on the western shore of the straits of the same name, 110 miles E. by N. of Palermo and 195 SSE. of Naples. The city occupies a narrow strip of coast between the harbour and the hills behind; the opposite or eastern side of the harbour is formed by a sickle-shaped tongue of rock, that only leaves a narrow entrance on the north. Although a very ancient city, Messina possesses few antique buildings or remains. The destructive hands of enemies, and the still more destructive agency of earthquakes, are responsible for this. The greater part of the city was laid out, regularly, with handsome houses, after the earthquake of 1783. The cathedral was begun by Count Roger the Norman in 1098, but has been almost wholly rebuilt since then. This and the churches of St Gregory and St Niccolo are adorned with magnificent mosaics. The cathedral has also a gorgeous high-altar and *baldacchino*, and a venerated treasure in a reputed letter of the Virgin to the townsmen. The citadel was built by Charles II. of Spain in 1680, the Gonzaga Castle in 1540, and another castle in 1547–57. The handsome theatre, the palaces, and official buildings are for the most part modern. There are here a university, founded in 1549, with fifty teachers and two hundred students, a college of the fine arts, an academy of the sciences and arts, scientific collections, and technical schools. Messina is an archbishop's see. The industry is confined chiefly to muslin, linen, and silk goods, the working of coral, and the preparation of fruit essences. The harbour, which is very deep and well protected, is entered annually by some 3370 vessels of 1,277,000 tons burden, bringing imports (wheat, cottons, flour, hides, coals, dried fish, woollens, iron, &c.) to the annual value of £1,094,280. The exports, embracing principally fruits and their manufactured products, such as wine, essences, olive-oil, seeds, &c., average £1,264,720 annually. More than half the shipping is Italian, and about one-third British. Pop. (1881) of the city, 78,438, and of the commune, 126,497.

Founded in 732 B.C. by the people of Cumæ, the place was first called Zancle (i.e. a sickle), and through the commercial enterprise of its people rapidly grew in prosperity. In 495 Anaxilas of Rhegium seized the town and changed its name to Messana (Messene). The Carthaginians conquered it and destroyed it in 396, and in 288 it fell into the hands of the Mamertines, who again changed its name to Mamertina. The intestinal quarrels of these people gave occasion to the outbreak of the Punic war between Carthage and Rome, on the conclusion of which (241 B.C.) the city became Roman, and in due time passed to the Eastern Empire. The Saracens took the city in the 9th century, and were only expelled in the 11th century by the Normans. Here the Sicilian Vespers' massacre raged in 1282, and from that year down to 1713 Messina belonged to Spain. The people revolted in 1671 and were backed up by France, but were reduced to submission in 1678, and at the same time deprived of their privileges of self-government. Then in 1743 the plague, and forty years later an earthquake, came to complete the ruin of the city. It was, moreover, bombarded by the Neapolitans in 1848, and in 1861 it was the last place in Sicily to yield to the Sardinian (Italian) troops. The *province* of Messina has an area of 1246 sq. m., and a pop. (1881) of 460,924 and (1889) 511,315.

Messina, STRAIT OF (Lat. *Mamertinum fretum*, or *Fretum Siculum*), separates Italy from Sicily, is 24 miles in length, and varies from 2½ to 14 miles in breadth. Since 1879 a scheme for making a railway tunnel under the strait has been under discussion, but as yet it has come to no practical result. See SCYLLA AND CHARYBDIS.

Messuage, the legal term used in English law to describe a dwelling-house and piece of land adjoining.

Metabolism, a general term for the chemical changes of living matter. See FUNCTION, PHYSIOLOGY, PROTOPLASM.

Metallurgy. A brief account will be given here of ancient metallurgy and of that department of modern metallurgy relating to the mechanical treatment of ores.

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Ancient Metallurgy.—From an ethnological point of view one of the most interesting questions connected with the origin of the industrial arts is when, and under what circumstances, man first began to work metals by softening or melting them by means of a high heat. The art of smelting ores was probably discovered by observing the effect of a big fire on some rich ore that happened to be in the way. Gold is always found native, and silver and copper sometimes. The ancient Egyptians worked in gold, silver, and bronze with a degree of skill that could only have been reached by gradual steps extending over thousands of years. In the notes to his edition of *Wilkinson's Ancient Egyptians*, Dr Birch says that it is uncertain whether metallic tin was known to them, as Bronze (q.v.) may have been made by the use of tin ore along with copper. He also states that the question of the use of iron among them has been rendered doubtful by the few specimens of that metal found in the monuments and sepulchres. Some examples, however, have been met with, although only in one case apparently is the approximate age of the object known. It is iron wire in a bronze statue of the time of the Ramesids. In India and some other parts of Asia malleable iron is made directly from rich ores in furnaces scarcely bigger than chimney-cans, by a process in use from time immemorial; and by a similar process savages in some parts of Africa also smelt iron. It is supposed by some archæologists that most parts of Africa passed directly from the stone to the iron age, but there seems to be evidence that in some places on that continent the making of various articles of the copper of the country has been long practised by aboriginal tribes.

Among the remains found in the lake-dwellings of central Europe are crucibles for melting metals, ingots of copper and tin, and in one crucible traces of gold were found. Bronze implements are abundant, but the considerable number of copper hatchets which have now been discovered has raised the question as to whether in prehistoric times a copper age has not preceded those of bronze and iron. Copper is more easily smelted than iron; and bronze, being an alloy of copper and tin, must somewhere have been preceded in its application to hatchets or other articles by unalloyed copper, although this may not have been the case in Europe. Some copper hatchets, and other implements of this metal, are the only evidence we have that the ancient Mexicans made any use of metal tools; though their artificers were skilled in casting gold and silver, and in hammered work and chasing, and tin as well as copper ore was mined, and the two combined as bronze. The early tribes inhabiting the country about Lake Superior, where native copper is plentifully found, made knives and ornaments of the metal by hammering it cold, in some cases, it is believed, with stone implements. Small chisels, rings, idols, and other objects made of gold and of ancient date, some of which are of thin, flat beaten plates, have been obtained in the republic of Colombia, South America. Silver articles of a rude archaic character appear to be rare. It is likely that the working of these native metals in the cold state in certain limited areas preceded the art of manipulating any metal by heat.

See Lubbock's *Prehistoric Times*, Munro's *Lake-dwellings of Europe*, Nadaillac's *Prehistoric America*, and various papers in the volumes of *Contributions to Knowledge* published by the Smithsonian Institution.

Modern Metallurgy.—As now understood this is the art of extracting metals from their ores. The operations are partly mechanical and partly chemical. Those processes which depend principally on chemical reactions for their results have reference chiefly to the roasting and smelting of ores, and are described under the heads of the different metals. But there are certain preliminary operations of a mechanical kind which metallic ores undergo, such as crushing, jigging, washing, &c., which we shall describe here, as they are essentially the same for the ores of lead, copper, tin, zinc, and indeed most of the metals. Until comparatively recent times ore, or rather ore-gangue, as it came from the mine was in the first instance broken by hammers before being passed on to crushing-rollers or stamps to be reduced to smaller pieces or grains. In the year 1858 Mr E. W. Blake of New Haven, Connecticut, invented a stone or ore crusher which has become so extensively used that it has, except in special cases, superseded hand-labour for breaking up large pieces of ore. Fig. 1 shows in section a modification of Blake's ore-crusher, made by Marsden of

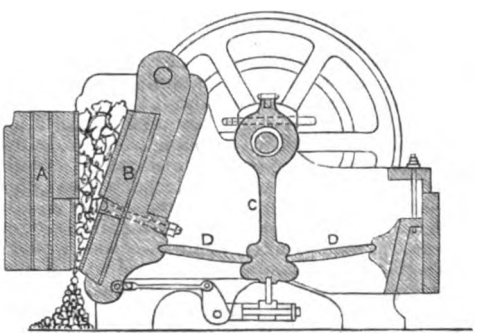

Fig. 1.

Leeds. The shaded portion shows the fixed jaw, A, and the movable jaw, B, between which the ore or stone is crushed. To the movable jaw a rapid biting movement (reaching 250 strokes per minute) is given by means of an eccentric lever and toggle-joints. C is the rod connecting the eccentric with the toggle-plates, DD. The machine is driven by a shaft and pulley, and has a balance-wheel. A spring or lever near the base of the machine aids the return movement of the jaw, B.

The vein-stuff or impure ore is next taken either to the crushing-rollers or to the stamping-mill. Fig. 2 shows a section of a crushing-mill of German

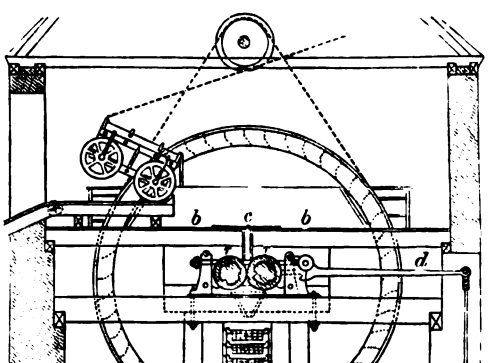

Fig. 2.—Ore-crushing Mill:
End view of the crushing-rollers, sieves, and bucket-wheel.

design, but nearly resembling that in use in Cornwall for treating copper, lead, and zinc ores. The ore, already reduced by the Blake jaw-crusher to

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pieces roughly 1¼ inch in diameter, is raised to the floor or platform, *b*, *b*, and by means of an opening at *c* passed down to the crushing-rollers, *r*, *r*. These are usually from 10 to 30 inches in diameter and at least 10 inches long, made of chilled cast-iron or steel, and with a lever at *d* to keep them in position. Below the rollers a shoot conveys the crushed ore to a series of sieves increasing in fineness from the top to the bottom, and what is separated by each sieve falls into a separate pit. Such pieces of ore-stuff as are too large to go through the top sieve or riddle fall into the raff-wheel or bucket-wheel, and are by it raised again to the floor to be recrushed. In Cornwall a sieve or riddle cylindrical in shape is used, and it slopes so that stuff too large to go through its meshes is raised by the raff-wheel to get a second crushing. Only about 13 per cent. of the ore-stuff crushed in the Cornish mill exceeds 7½ millimetres in size.

For pulverising some ores—tinstone and auriferous quartz, for example—a stamping-mill is used. It consists of a series of upright shafts with a weighty piece of iron at the bottom of each. They are raised by means of an axle with projecting cams, and then falling by their own weight act like hammers. Except in chlorination and amalgamation works (see GOLD), the wet process of stamping is generally adopted—that is, the cast-iron or steel shoes of the stamps work upon cast-iron or quartz bottoms placed in stamp-troughs filled with water.

Sizing apparatus or sorting machines are employed for dividing the crushed ore-stuff into grains of several sizes. A common hand-riddle is the simplest form of sizing implement. One kind of apparatus in use consists of a series of flat-bottomed sieves with graduated meshes placed on different levels and mechanically agitated so as to pass the stuff across the perforated bottoms. The first sieve separates the largest grains, the second the next in size, and so on. A rotating drum-sieve or trommel is, however, more frequently employed. It is placed horizontally, and is to some extent conical in shape. Sometimes it is one long continuous trommel in sections, in which case the finest stuff passes through the first section, the next larger through the second, and so on through, say, five or six divisions to the largest grains. In other cases a system of separate conical trommels, in which the sizing takes place from large to small grains, is employed. With the trommel water is used, and, although its axis may be quite level, the falling angle of its shell together with its motion impels the ore-stuff from the smaller to the larger end. Trommels are used for clearing off earthy matter and for draining off water from ore as well as for sizing.

After the ore-stuff has been sorted according to the size of the grains, the next step is to separate by specific gravity the pure ore from the gangue or non-metallic minerals associated with it. If the reduced particles be those of vein-stuff containing more than one kind of ore, these are also separated by gravity. If equal-sized grains of galena, blende, and quartz, whose respective densities are 7·5, 4, and 2·7, are allowed to fall freely in some depth of water, the three substances will separate into layers at the bottom, in which case the lead ore (galena) will form the lowest, the zinc ore (blende) the middle, and the quartz the top layer. But in hydraulic jiggers (some are pneumatic) the column of water, at most under 3 inches, is too shallow to admit of separation by simply dropping the grains. Consequently these are placed in a sieve immersed in water, and subjected to a repeated up-and-down motion, in which the ascent of the jigging stuff takes place by jerks, but in the descent it falls freely. In this way the pure ore, or at least the best ore, accumulates at the bottom, and is usually sufficiently rich for smelting. The gangue on the surface is skimmed off or otherwise removed. In hand-jigging the sieve is vigorously jerked in a tub of water; in the brake-jigger the jerking motion is produced by a hand-lever and connecting rod; and in continuous jiggers mechanical contrivances are used to carry into different receptacles the mineral grains separated upon the sieve in layers without interrupting the jigging process.

The dressing of fine sandy, mealy, or slimy ore-stuff, which is not suitable for jigging, is effected on buddles or sloping tables. Buddles are inclined planes, often circular, or rather conical in shape, over which the fine stuff suspended in water descends. In doing so the heavier metallic particles fall at the top of the table or cone while the lighter waste is carried down to the foot.

For detailed descriptions and illustrations of ore-dressing machines, see Hunt's *British Mining* (1884), and an exhaustive report on the 'Mechanical Dressing of Ores,' by E. F. Althans, in the *Reports of the Philadelphia Exhibition, 1876*.

Metal Mountains. See ERZGEBIRGE.

Metals. Although each metal is considered in a separate article, there are various points regarding the general physical and chemical characters of these bodies, and the method of classifying them, which require notice. A metal, from the chemical point of view, is an element which can replace hydrogen in an acid and thus form a salt. Hydrogen itself is, chemically, considered to be a metal. Those elements which are non-metallic in this sense are called *metalloids*.

Amongst the chief *chemical* properties of metals we notice their strong affinities to certain of the non-metallic elements. All the metals, without exception, combine with oxygen, sulphur, and chlorine, and often in several proportions, forming oxides, sulphides (formerly termed sulphurets), and chlorides. Many of them combine with bromine, iodine, and fluorine. The other compounds of this nature, excepting carbide (formerly carburet) of iron, or steel, and the hydrides of arsenic and antimony (commonly known as arseniuretted and antimoniuretted hydrogen), which are of importance in toxicology, may be passed over without notice. The metallic oxides are, without exception, solid bodies, white or coloured, and usually present an earthy appearance. Hence the old name of *metallic calx* applied to these oxides. Those oxides which are termed basic possess the property of directly uniting with the so-called oxy-acids (such as sulphuric, nitric, carbonic, and silicic acid), and of forming new chemical compounds of the second order, termed Salts (q.v.). The compounds of the metals with chlorine, iodine, bromine, and fluorine—such, for instance, as chloride of sodium, or common salt, ClNa—are termed haloid salts. The same metal may often combine both with chlorine and with oxygen in more than one proportion. For example, we have subchloride of mercury, Hg_2Cl_2; suboxide of mercury, Hg_2O; chloride of mercury, $HgCl_2$; oxide of mercury, HgO. For the compounds of the metals with sulphur, see SULPHUR.

The following are the most important of the *physical* properties of the metals: (1) All metals, unless when they are in a finely-pulverised form, exhibit more or less of the characteristic lustre termed metallic. Two of the non-metallic elements, iodine and carbon, in some forms also present a metallic lustre. (2) All metals are good conductors of heat and electricity, although in very unequal degrees. (3) With the exception of mercury, all the metals are solid at ordinary temperatures. With the exception of gold, copper, calcium, and strontium, the metals are, when light is only once reflected from them, more or less white,

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with a tendency to blue or gray. Most of them have been obtained in crystals, and probably all of them are capable of crystallising under certain conditions. (4) Metals are remarkable for their opacity, except when they are chemically reduced to extremely thin films. (5) All the metals are fusible, although the temperatures at which they assume the fluid form are very different (see MELTING-POINT); and some of them, as mercury, arsenic, cadmium, zinc, &c., are also volatile. (6) Great weight, or a high specific gravity, is popularly but erroneously regarded as a characteristic of a metal; while platinum, osmium, and iridium (the heaviest bodies known in nature) are more than twenty times as heavy as water, lithium, potassium, and sodium are actually lighter than that fluid. (7) Great differences are observable in the hardness, brittleness, and tenacity of metals. While potassium and sodium may be kneaded with the finger, and lead may be marked by the finger-nail, most of them possess a considerable degree of hardness. Antimony, arsenic, and bismuth are so brittle that they may be easily pulverised in a mortar; while others, as iron, gold, silver, and copper, require great force for their disintegration. Taking iron and lead as representing the two extremes of tenacity, it is found that an iron wire will bear a weight twenty-six times as heavy as a leaden wire of the same diameter. See DUCTILITY, MALLEABILITY.

Metals enter into combination with one another when they are fused together, and such combinations are termed *Alloys* (q.v.), unless when mercury is one of the combining metals, in which case the resulting compound is termed an *Amalgam* (q.v.). It is doubtful whether all alloys are true chemical compounds. Definite compounds of the metals with each other do, however, certainly exist, and are sometimes found native, as, for example, the crystallised silver and mercury compound represented by the formula AgHg.

In consequence of their strong affinities for the metalloids the metals are seldom found in a free or uncombined state, even in the inorganic kingdom, and never in animals or plants. The more common metals, in consequence of their strong affinity for oxygen and sulphur, are very rarely met with in the uncombined state; but some of those which are less abundant, such as gold, silver, and platinum, are found uncombined, in which case the terms *native* and *virgin* are applied to them; and other metals, as mercury and copper, occur both in a free and in a combined state. Many native alloys are found, but the ordinary sources of the metals are oxides, sulphides, chlorides, and carbonates, sulphates, and other salts. These are termed the *ores* of the metals. The methods of obtaining the metals from their various ores fall under the head of METALLURGY.

Various classifications of the metals have been suggested by different chemists. The following is probably one of the most convenient:

(I.) The *Light Metals*, subdivided into—

(1) The metals of the alkalies—viz. potassium, sodium, cæsium, rubidium, lithium.

(2) The metals of the alkaline earths—viz. barium, strontium, calcium, magnesium.

(3) The metals of the true earths—viz. aluminium, glucinum, zirconium, yttrium, erbium, terbium, thorinum, cerium, lanthanum, didymium.

(II.) The *Heavy Metals*, subdivided into—

(1) Metals whose oxides form powerful bases—viz. iron, manganese, chromium, nickel, cobalt, zinc, cadmium, lead, bismuth, copper, uranium, thallium.

(2) Metals whose oxides form weak bases or acids—viz. arsenic, antimony, titanium, tantalum, niobium (or columbium), tungsten, molybdenum, tin, vanadium, osmium.

(3) Metals whose oxides are reduced by heat—noble metals—viz. mercury, silver, gold, platinum, palladium, iridium, ruthenium, rhodium, osmium. (Several of the rare metals are here omitted.)

Another classification is that by which the metals are arranged in six groups, each group being named after a metal which possesses the common characters in a well-marked degree: viz. (1) the sodium group, (2) the calcium, (3) the iron, (4) the copper, (5) the platinum, and (6) the antimony groups.

Metal-work, ARTISTIC. Leaving celebrated statues and groups cast in bronze to be described under the head SCULPTURE, we shall briefly notice here a few important examples of artistic work in metal which are rather classed as specimens of decorative art than of pure sculpture. Of early gold and silver work one of the most renowned objects is the altar made of these two metals in the church of St Ambrose at Milan. It was executed by Wolvinus in the 9th century, and contains figures in relief of Christ and the Apostles with ornamental borders in enamel. Another very fine example of work in gold and enamel is the *Pala d'Oro* (altar front) of St Mark's, Venice, by Byzantine artists of the 10th or 11th century. Some specimens of Celtic art, partly in precious metal, such as the Tara Brooch and the Ardagh Chalice—the latter supposed to be of the 10th century—are of exquisite beauty (see BROOCH). The shrine of the Magi in Cologne Cathedral is a magnificent reliquary of the 12th century, in which the figures are of gold and the architectural decorations covered with enamels and precious stones. A considerable number of specimens of ecclesiastical gold and silver work of the 13th century remain, including a few of great interest. Of 14th-century examples—a time when the goldsmith's art ceased to be employed exclusively in the service of the church—the splendid silver reliquary in the church of Orvieto, by Ugolino of Siena, is very remarkable. Perhaps the two most important monuments of the goldsmith's art made in the middle ages are the altar of St James, Pistoia, and that of the Baptistery of St John at Florence. They were begun in the 14th century, and a number of the most famous Italian artists were in succession engaged upon them for a period of 150 years. Both are of silver, one of them being decorated with subjects from the life of St James, and the other with scenes from the life of St John. Giglio of Pisa, Pietro Tedesco, Ricciardi, Cipriano, and Filippo were among the artists engaged on the St James' altar; and Cioni, Ghiberti, Cenni, Verrocchio, and Pollaiuolo worked at that of St John. Some of the greatest artists in Italy in the 14th and 15th centuries practised to some extent the goldsmith's art, including Lucca della Robbia, Ghiberti, Brunelleschi, Donatello, and Jacopo della Quercia. In the 16th century Cellini's is the greatest name, although well-authenticated works by him in the precious metals are few in number. There are some very artistic productions in pewter by the French artist François Briot, who lived in the 16th century.

Bronze is a metal in which many fine works have been executed, and these are often of large size. Few early examples exist of which the artists are known. Stanracius of Constantinople cast in the 11th century the bronze gates of St Paul's-without-the-Walls at Rome, destroyed in 1823, but of which drawings exist. A century later an artist named Barisanus made the fine bronze door of the cathedral of Monreale in Sicily. One of the most artistic productions in this metal of the 13th century is the candelabrum in Milan Cathedral, 15 feet high. The east door of the Baptistery at Florence,

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upon which Ghiberti was engaged from 1425 to 1452, is considered a marvellous work of art. Another door in this building, by A. Pisano, completed in 1430, after being in progress for twenty years, is also an admirable production. P. Vischer's shrine of St Sebald at Nuremberg is a beautiful monument which, though quite different in form from the objects named above, resembles them in the design being an intimate combination of small works in sculpture and architectural ornament. A fountain in the Maximilian-strasse, Augsburg, executed by H. Gerhard in 1593, has been much admired. For want of space we can only name two more bronzists—B. Morel, who did the great candelabrum in Seville Cathedral, and L. Bernini, who in the 17th century executed many clever works in Italy.

There is perhaps no class of metal objects in which artistic skill is more marvellously displayed than in some of the rich suits of armour made in the end of the 15th, but chiefly in the 16th century. These are for the most part of iron or steel, with ornament in *repoussé* or engraved; sometimes with both combined, and occasionally with damascening in gold and silver. Among those who practised the armourer's art in Italy the most famous names are Michelagnolo, Filippo Negrolo, Romero, and some members of the Piccinini family. In Germany Kollman of Augsburg, and in France Antoine Jacquard stood high. Some of the finest suits of armour made at this period are in the Museum of Arms at Dresden, and in the Louvre and Musée d'Artillerie, Paris.

Wrought-iron work, rude but effective, appears on the wooden doors of some Romanesque churches of the 12th century. In the 13th and 14th centuries the work in this metal became more refined, and among admirable examples of the latter period may be mentioned the screens round the tombs of the Scala family at Verona, and a screen in the church of Santa Croce, Florence. Screens, grilles, and other objects with open wrought-iron ornament, beautifully designed, and ranging over a period from the 13th to the 16th century, but especially those made during the 15th and 16th, are found in many churches in Germany, Spain, France, and England. In the latter country the early grille over Queen Eleanor's tomb, Westminster, and the later screen to Edward IV.'s at Windsor are fine examples; so also are the still later (18th century) railing-panels made for Hampton Court Palace by Huntington Shaw. The canopy of a draw-well at Antwerp by Quentin Matsys is one of the best works of its kind in hammered iron. Many of the elaborately chiselled iron locks and hinges made at Nuremberg and Augsburg in the 15th and 16th centuries are wonderfully beautiful. The National Museum at Munich is especially rich in specimens of these.

See Digby-Wyatt, *Metal-work* (1852); the South Kensington Museum [Descriptive] *Catalogue of Bronzes*, by Fortnum, and of *Gold and Silversmith's Work*, by J. H. Pollen; Hefner-Alteneck, *Serrurérie* (1870); Raschdorff, *Abbildungen Deutscher Schmiedewerke* (1878); *Œuvres de Richard de Lalonde;* E. Plon, *B. Cellini, Recherches sur sa Vie et sur son Œuvre* (1883); G. W. Yapp, *Metal-work* (chiefly modern).

Metamorphosis, a term applied in ancient mythology to the frequent transformation of human beings into beasts, stones, trees, and even into fire, water, or the like, which are essential parts of popular folklore everywhere. These metamorphoses afforded a subject to Greek poets and writers of the Alexandrine period, and to Ovid among the Romans. See BEAST-FABLES and FOLKLORE.—In Zoology the term Metamorphosis is applied to such marked changes as those from caterpillar to insect, or from tadpole to frog, where the young form or larva is strikingly different from the adult. See the articles on Amphibia, Caterpillar, Crustacea, Echinoderms, Frog, Insects, &c.; and for Metamorphosis in Botany, see MORPHOLOGY and FLOWER.—In Geology the term *metamorphism* is applied to the alteration undergone by rocks under heat, pressure, and other influences, so that they assume a crystalline or semi-crystalline structure. See GEOLOGY, Vol. V. p. 151.

Metaphor (Gr. *metaphora*, 'a transference'), a figure of speech by means of which one thing is put for another which it only resembles. Thus, the Psalmist speaks of God's law as being 'a light to his feet and a lamp to his path.' The metaphor is therefore a kind of comparison implied but not formally expressed, in which the speaker or writer, casting aside the circumlocution of the ordinary similitude, seeks to attain his end at once, by boldly identifying his illustration with the thing illustrated. It is thus of necessity, when well conceived and expressed, graphic and striking in the highest degree, and has been a favourite figure with poets and orators, and the makers of proverbs, in all ages. Even in ordinary language the meanings of words are in great part metaphors; as when we speak of an *acute* intellect, or a *bold* promontory. The metaphor is false if the simile involved cannot be intelligibly evolved from it; and, to avoid what are often called *mixed* metaphors, it is well that the implicit simile should be conceived objectively, as in a picture. Such cases of confusion as Cromwell's 'God has kindled a seed in this nation' are obvious enough, but most often the *mixed* metaphor is wrapped up in a cloud of rhetoric, as in De Quincey's sentence: 'The very recognition of these or any of them by the jurisprudence of a nation is a *mortal wound* to the very *keystone* upon which the whole vast arch of morality reposes.' Ruskin in his *Præterita*, describing Rogers's cold reception of him as a boy, says: 'The cultivation of *germinating* genius was never held by Mr Rogers to be an industry altogether delectable to genius *in its zenith*.'

Metaphysical Poets, a term first applied by Dr Johnson in his life of Cowley to the group of which Donne is the most outstanding example. They were men of learning, and to show their learning was their whole endeavour; they neither copied nature nor life, hence their thoughts are often new but seldom natural; the most heterogeneous ideas are yoked by violence together, nature and art being ransacked for illustrations, comparisons, and allusions; they failed, as might have been expected, in moving the affections or attaining the sublime, but what they wanted they endeavoured to supply by hyperbole—their amplifications had no limits, they left not only reason but fancy behind them, and produced combinations of confused magnificence that not only could not be credited but could not be imagined. Yet, if they frequently threw away their wit upon false conceits, they likewise sometimes struck out unexpected truth: if their conceits were far-fetched, they were often worth the carriage. Such is Johnson's explanation of the phrase and its meaning, and it must be admitted that the name is to a certain extent appropriate enough, for the philosophising and analytic spirit pervades the works of the whole school, and intellect rather than emotion is ever the stuff out of which their phantasies are framed. Their constant weakness is the tendency towards conceits and similes that are merely fantastic and ingenious, which mars a modern reader's pleasure in almost every poem of Donne and Cowley.

Metaphysics, a word first applied to a certain group of the philosophical dissertations of Aristotle, containing what Aristotle (q.v.) called 'first philosophy,' and Plato 'dialectics.' The phrase *meta*

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ta physika means probably 'the books after the physics,' but has been interpreted 'the matters above or beyond physics.' The branch of philosophy so called is the highest department, and deals with speculative questions as to the nature and limit of human consciousness and the possibility of establishing truths beyond empirical consciousness. The term has been sometimes used, as by Mansel, to comprise Psychology along with metaphysics proper or Ontology. See PHILOSOPHY.

Metaphyta, many-celled plants, in contrast to the single-celled Protophytes.

Metastasio, the Greek form of the surname of PIETRO TRAPASSI, an Italian poet, who was born of humble parents at Rome, on 6th January 1698. A precocious boy, he improvised verses and recited them to crowds on the street. This gift gained him a patron in his ninth year, one Gravina, a celebrated Roman lawyer, who educated him, and on his death (1718) left him his fortune. In 1722 Metastasio wrote his first libretto at Naples, which so charmed the great Roman singer Bulgarini, called La Romanina, that she took him into her house, and launched him on his successful career as a writer of opera-libretti—libretti which possess some real poetic qualities. These dramas, all with classical subjects, were set to music by some of the greatest composers then living, as Pergolese, Scarlatti, Durante, Hasse, Paesiello, Marcello, and others, and sung by some of the greatest singers who have ever lived, Farinelli and Caffariello. In 1729 Metastasio was appointed court-poet to the theatre at Vienna, for which he wrote several of his best pieces. His reputation spread rapidly and stood high throughout Europe, but from 1825 to 1865 his name was anathema in Italy. He died in Vienna on 12th April 1782, having for nearly forty years suffered from 'mental and moral ennui.' Good collected editions of his dramas were published at Genoa (1802) and at Padua (1811); and his Letters were edited by Carducci (Bol. 1883). See Vernon Lee's *Studies of 18th Century in Italy* (1880), and Lives by Burney (1796), Mussafia (1882), and Falconi (1883), the first in English, the last two in Italian.

Metaurus, a river of Central Italy, still called the Metauro or Metro, emptying into the Adriatic near Fano. On its banks the Romans defeated the Carthaginians under Hasdrubal in 207 B.C.

Metayer System, or MÉTAIRIE. See LAND LAWS, Vol. VI. p. 505.

Metazoa, many-celled animals, in contrast to the single-celled Protozoa (q.v.).

Metellus, the name of a Roman family of the plebeian gens Cæcilia, which rose to be one of the first families of the Roman nobility.—One of the most distinguished members of the family was Quintus Cæcilius Metellus Macedonicus, who received his surname from his victory over Andriscus, an aspirant to the throne of Macedonia (148 B.C.). His life was considered by ancient writers an example of the greatest felicity: before his death in 115 three of his sons had been consuls, one censor, and one was a candidate for the consulship. Another was Quintus Cæcilius Metellus Numidicus, who twice defeated Jugurtha in Numidia (109 B.C.), and was celebrated for his integrity of character, but was superseded in his command by Marius. His son, Quintus Cæcilius Metellus, surnamed *Pius*, joined Sulla in 83 B.C., but sought to moderate the severity of his proscriptions. Quintus Cæcilius Metellus Creticus conquered Crete, and reduced it to a Roman province (67 B.C.). Quintus Cæcilius Metellus Pius Scipio, sometimes called Quintus Scipio, and sometimes Scipio Metellus, was a son of Scipio Nasica, who was adopted by one of the Metelli, and became the father-in-law of Pompey, and his zealous partisan. He commanded the centre at Pharsalia, maintained war on his behalf for some time in Africa, and, after the battle of Thapsus (46 B.C.), died by his own hand.

Metempsychosis. See TRANSMIGRATION.

Meteorology (Gr. *meteōra*, 'meteors, or atmospheric phenomena') was originally applied to the consideration of all appearances in the sky, both astronomical and atmospherical; but the term is now confined to that department of physics which treats of the phenomena of the atmosphere as regards weather and climate. Owing to the complexity of the phenomena, meteorology is the most difficult and involved of the sciences, and may seem, at first sight, almost incapable of being reduced to a science at all. On this account, the only procedure admissible in the first place is a faithful recording of facts by long and patient observation.

From the nature of the subjects which make up the science, it may be inferred that they occupied men's minds from a remote antiquity. From the time spent in the open air in the early ages, and from the imperfect protection afforded against the inclemency of the seasons, those appearances which experience proved to precede a change of weather would be eagerly recorded and handed down. In this way many valuable facts were ascertained and passed current from hand to hand; and perhaps there is no science of which more of the leading facts and inferences have been from so early a period incorporated into popular language. Aristotle was the first who collected, in his work *On Meteors*, the current prognostics of the weather. Some of these were derived from the Egyptians, while a considerable number were the result of his own observation. Theophrastus, one of Aristotle's pupils, classified the opinions commonly received regarding the weather under four heads—viz. the prognostics of rain, of wind, of storm, and of fine weather. The subject was discussed only in its popular and practical bearings, and no attempt was made to explain phenomena whose occurrence appeared so irregular and capricious; but still the treatise of Theophrastus contains about all that was known down to comparatively recent times. No real progress was made till instruments were invented for making observations with regard to the temperature, the pressure, the humidity, the purity, and the electricity of the air. The discovery of the weight or pressure of the atmosphere made by Torricelli in 1643 was undoubtedly the first step in the progress of meteorology to the rank of a science. As this memorable discovery discloses what passes in the more elevated regions of the atmosphere, it follows that the elevations and depressions of the barometric column largely extend our knowledge of the subject. Indeed, nearly all of the more important of the discoveries of modern meteorology have been made through the barometric observations.

The invention and gradual perfecting of the thermometer in the same century formed another capital advance; as without it nothing beyond vague impressions could be obtained regarding temperature, the most important of all the elements of climate. Fahrenheit constructed small and portable thermometers, which, being carried by medical men and travellers over every part of the world, furnished observations of the most valuable description. By such observations alone the comparative temperature of different countries became known, and the exaggerated accounts of travellers with regard to extreme heat and cold were reduced

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to their proper significance. Scarcely less important was the introduction of the hygrometer, first systematically used by De Saussure (died 1799), and subsequently improved by Dalton, Daniell, August, and Regnault. From the period of the invention of these instruments the number of meteorological observers greatly increased, and a large body of well-authenticated facts of real value was collected. The climates of particular parts of the earth were approximately determined, and the science made great and rapid advances by the investigations into the laws which regulate the changes of atmospheric phenomena.

The theory of the trade-winds was first propounded by George Hadley in the *Philosophical Transactions* for 1735; and it may be mentioned as a remarkable fact that for about half a century it remained unnoticed, and then was independently arrived at by Dalton. The publication of Dalton's Meteorological Essays, in 1793, marks an epoch in meteorology. It is the first instance of the principles of science being brought to bear on the explanation of the intricate phenomena of the atmosphere. The idea that vapour is an independent elastic fluid, and that all elastic fluids, whether alone or mixed, exist independently; the great principles of motion of the atmosphere; the theory of winds, their effect on the barometer, and their relation to temperature and rain; observations on the height of clouds, on thunder, and on meteors; and the relations of magnetism and the aurora borealis—these are some of the important questions discussed in these remarkable essays, with singular acuteness, fullness, and breadth of view.

One of the most interesting and fruitful subjects of inquiry that engaged the attention of meteorologists was *dew*. The observations on this subject were first collected and reduced by Dr Wells, and the theory he advanced, supplemented by the recent researches of Mr John Aitken, gives a complete explanation of the phenomenon (see DEW).

In 1823 Daniell published his *Meteorological Essays and Observations*, which, while adding largely to our knowledge in almost every department of the subject, are chiefly valuable as bearing on the hygrometry of the atmosphere. Though the practical advantages which he anticipated to flow from it have not been realised, yet this difficult department of meteorology still stands indebted to him perhaps more than to any other physicist. The law of the diffusion of vapour through the air, its influence on the barometric pressure, and its relations to the other constituents of the atmosphere are among the least satisfactorily determined questions in meteorology. Since this element is so important in originating changes of weather and as an indicator of storms, and since so much remains still to be achieved, it is to be hoped that it will soon be more thoroughly investigated, particularly in its relations to solar and terrestrial radiation. As the humidity to some extent obstructs solar and terrestrial radiation, it follows that if the air were quite drained of its aqueous vapour the extremes of heat and cold would be so intense and insufferable that all life would perish, as there would be no screen shielding the earth from the scorching heat of the sun by day, and from the equally scorching and blighting effects of its own radiation by night.

Electrical observations have been, of all meteorological observations, perhaps the least productive of results advancing the science, partly owing to their scantiness, and from the expense and trouble attending them.

Humboldt's treatise on *Isothermal Lines* (1817) constitutes a notable epoch in practical meteorology. Dové and, more recently, the present writer have continued the investigation, and given charts of the world, showing the temperature for each month and for the year. In 1868 another series of important charts were published by the writer, showing, by isobaric lines, the distribution of the mass of the earth's atmosphere, and by arrows the prevailing winds over the globe for the months and the year. These charts, since revised by him, and published in one of the *Challenger* reports, show the movements of the atmosphere and their immediate cause. It is thus seen that the prevailing winds are the simple result of the relative distribution of the mass of the earth's atmosphere; or that the direction and force of the prevailing winds are simply the flow of the air from a region of higher towards a region of lower pressure, or from where there is surplus to where there is a deficiency of air. On this broad and vital principle meteorology rests, and it is of universal application throughout the science in explanation not only of prevailing winds, but of all winds, and of weather and weather changes generally. Further, it supplies the key to the climatologies of the globe; for climate is determined by the temperature and moisture of the air, and these in their turn by the prevailing winds. In 1882 Loomis published a map representing in colours the mean rainfall of the globe. This map and others that have been constructed for separate countries show that the rainfall is everywhere determined by the prevailing winds, considered with respect to the regions from which they have immediately come, and the physical configuration and temperature of the part of the earth's surface over which they blow. The highest rainfalls are precipitated by winds which, having traversed a large breadth of ocean, come up against and blow over a high ridge lying across their path; and the amount is still further increased if the winds pass at the same time into regions the temperature of which constantly becomes colder. Of this the winter rains of north-western Europe and the summer rains of Japan are good examples. On the other hand, the rainfall is very small, or *nil*, where the prevailing winds have not previously traversed some extent of ocean, but have crossed a high ridge and now advance into lower latitudes, or into regions the temperature of which is markedly higher. Good examples of this are the summer rains of California and adjoining regions, and those of the Indus valley.

The establishment of meteorological societies during the last half of the 19th century must also be commemorated as contributing in a high degree to the solid advancement of the science which, more than any other, must depend on extensive and carefully conducted observation. A special object of meteorological societies is to ascertain the degrees of temperature and moisture in various localities, and the usual periods of their occurrence, together with their effects on the health of the people and upon the different agricultural products; so that, by a knowledge of the laws by which the growth of such products is regulated, it may be ascertained with some degree of certainty whether any given article can be profitably cultivated. But perhaps none of the arts have benefited to so large an extent by the results arrived at by meteorologists as navigation. The knowledge thus acquired of the prevailing winds over the different parts of the earth during the different seasons of the year, the regions of storms and calms, and the laws of storms has both saved innumerable lives, and, by pointing out the most expeditious routes to be followed, shortened voyages to a remarkable degree. In this department the name of Maury (q.v.) deserves special commendation.

Another fruit of the multiplication of meteorological stations is the prediction of storms and

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'forecasts' of weather, first suggested in the United States about the middle of the 19th century. As regards the British Islands these 'forecasts' are based on telegrams which are received every morning from about sixty selected stations in Great Britain and Ireland, and on the Continent, which give the exact state of the barometer, thermometer, hygrometer, and rain-gauge, with the direction and force of the wind, and appearance of the sky, at each of these stations at eight in the morning. In the event of there being any storm or other atmospheric disturbance at one or more of these places, a full and accurate description of it is thus conveyed to London; and it is the duty of the officials there to consider the direction in which the storm is moving and is likely to move, so as to enable them to give warning of its approach at different ports by special signals. But in addition to warnings of storms, daily 'forecasts' of the weather likely to occur in the different districts of Great Britain for the following two days are also issued. As regards storms the problem to be practically worked out is this: Given telegrams showing the exact meteorological conditions prevailing over the area embraced by the stations, with indications of a storm approaching in a certain direction, to determine, not the probable area over which the tempest will sweep, but the precise localities which will altogether escape, the places where the storm will rage, its continuance, its violence, and the particular directions from which the wind will blow at places visited by the storm. Weather-registers extending over long periods give no countenance to the notion that there are regularly recurring cycles of weather on which prediction sufficiently precise and particular to be of service to agriculture and navigation may be based. The manner in which good and bad seasons occur in different places with respect to each other shows clearly that they have little *direct immediate* dependence on any of the heavenly bodies, but that they depend directly on terrestrial causes. Owing to its proximity to the Atlantic, Great Britain is not so favourably situated for the issue of warnings as the countries of Europe to the eastward. Since 1870 this branch of science has been prosecuted with remarkable energy and success by General Myer (familiarly known as 'Old Probability') and his successor in charge of the signal service of the United States War Department. American meteorologists were the first to undertake the representation of isothermals over the ocean; and to the United States science is also indebted for magnificent contributions and researches in international meteorology.

The study of meteorology has of late benefited largely by the establishment of high-level meteorological stations in the United States, France, Italy, Switzerland, Austria, India, Australia, Scotland, and many other countries. The nine arctic expeditions in 1882–83 devoted themselves largely to meteorological observations. Many first-class meteorological observatories are now established in all civilised countries at which hourly observations are made.

On the diurnal phenomena the more important principles of the science are based. Of the sun's rays which arrive at the earth's surface, those which fall on the land are wholly absorbed by the thin surface layer, the temperature of which consequently rises. A wave of heat is thence propagated downward through the soil, the intensity of which rapidly lessens with the depth at a rate depending on the conductivity of the soil, till at a depth of about 4 feet it ceases to be measurable. Part of the heat of this surface layer is conveyed upwards into the atmosphere by convection currents. But as regards the surface of the ocean the case is totally different. Here comparatively little of the heat is arrested at the surface, but it penetrates, as shown by the observations of the *Challenger* expedition, to a depth of about 500 feet. Hence in deep waters the temperature of the surface is but little heated by the direct rays of the sun, though in shallow waters, owing to the heating of the bottom, the water has a considerable daily range of temperature. Thus, in mid-ocean, from 30° N. lat. to 30° S. lat., the temperature of the surface of the sea does not vary during the day quite so much as one degree Fahrenheit. Off the coast of Scotland the daily variation is only 0·3°, and in higher latitudes still less. On the other hand, the daily variation of the upper layer of the surface of the land is frequently 50°, and in many cases very much greater. Hence the enormously different results which large masses of land and sea respectively exercise on climate. The temperature of the air over the ocean is about three times greater than that of the surface of the open sea over which it lies; but on nearing land it is nearly five times greater. The least daily variation on land is in insular situations, being at Rothesay about 5°; and the greatest in the Sahara regions of tropical and subtropical countries, where it is in many places 30°, rising on occasions to 40° and upwards. The daily minimum temperature occurs some time before dawn; and as regards the maximum, it occurs from 1 to 4 P.M., according to season and geographical situation, the earlier hour obtaining in arid climates and at true high-level observatories, and the later in climates characteristically humid.

The *absolute humidity* of the air, or, as it is usually termed, the elastic force of vapour, is seen in its simplest form on the open sea, as disclosed by the *Challenger* observations. The minimum occurs at 4 A.M. and the maximum at 2 P.M., thus approximating closely to the diurnal march of the temperature; on nearing land a secondary minimum prevails from 10 A.M. to 4 P.M., due doubtless to the drier descending aërial currents which take the place of the currents that ascend from the heated surfaces of the land. The *relative humidity* is widely different from the vapour pressure, and presents features of the simplest character. The maximum occurs from midnight to 4 A.M.; or when the temperature is lowest the air is nearest to saturation. On the other hand, the minimum is about 2 P.M.; or when temperature is highest the air is furthest from saturation. This feature of the humidity characterises all climates. When the air is by terrestrial radiation cooled below the dew-point *dew* is deposited, and when the temperature is below 32° *hoar-frost* is the result.

The *diurnal oscillations of the barometer* show two maxima and minima—the maxima occurring about 9 to 10 A.M. and 9 to 10 P.M., and the minima from 3 to 4 A.M. and 3 to 4 P.M. Since the temperature of the surface of the sea does not vary quite one degree during the day, and since these oscillations occur equally over the open sea as on land, it conclusively follows that they are independent of the temperature of the part of the surface of the globe on which the air rests. Generally speaking, the amount of the oscillations decreases with latitude. Taking latitude with latitude, the amounts are greatest over land surfaces which are greatly heated during the day and cooled during the night, and least over the anticyclonic regions of the great oceans lying to the westward of the continents from about 20° to 40° N. and S. lat. The characteristics of these anticyclonic regions is a vast descending current down their central spaces. This air necessarily increases in temperature with its descent, and consequently is further removed from saturation; and it is prob-

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ably due to this circumstance that the amount of the barometric oscillation is here reduced to the minimum for the latitude over all anticyclonic regions.

It has been further shown from the *Challenger* observations that the force of the winds on the open sea is subject to no distinct and uniform diurnal variation, but that on nearing land the force of the wind gives a curve as pronouncedly marked as the ordinary curve of temperature; the minimum occurring from 2 to 4 A.M. and the maximum from noon to 4 P.M. Each of the five great oceans gives the same result—the differences between the hours of least and greatest force being Southern Ocean, 6½ miles; South Pacific, 4½ miles; South Atlantic, 3¼ miles; and North Atlantic and North Pacific, 3 miles. This diurnal peculiarity of the wind's force is even still more pronounced over all tolerably open and extended surfaces of the land. But at true high-level observatories, situated on peaks, such as Ben Nevis, the reverse everywhere holds, so that the daily minimum velocity occurs during the warmest hours of the day, and the maximum at night during the coldest hours.

Thunderstorms have well-marked periods of diurnal variation over land and over the open sea respectively. In climates where rain falls equally at all seasons they are of most frequent occurrence during the hottest portions of the day and of the year, so far as concerns the land surfaces of the globe. Taking Ekaterinburg in the Urals as representing inland climates, observations show that there, during the twelve hours from 9 A.M. to 9 P.M. when temperature is above the daily mean, 717 occurred, but only 139 during the other twelve hours when temperature is under the mean. Thus the great majority occur during the time of the day when the ascensional movement of the air from the heated ground takes place, and attain the absolute maximum when the temperature and this upward movement are also at the maximum. On the other hand, the *Challenger* observations on the open sea show that the maximum occurrence is from 10 P.M. to 8 A.M., 22 having been observed during these ten hours and only 10 during the other fourteen hours of the day. This remarkable result suggests that over the ocean terrestrial radiation is more powerful than solar radiation in causing those vertical disturbances in the equilibrium of the atmosphere which give the thunderstorm.

Atmospheric vapour and ascending currents, and the descending currents which necessarily accompany them, play an important part in the development, course, and termination of thunderstorms. Where the climate is dry and rainless, like that of Jerusalem in summer, thunder is altogether unknown; and where an anticyclone with its descending currents rests over a region, as happens over the centre of the Europeo-Asiatic continent in winter, thunder is equally unknown during that season. The diurnal periods of *hail*, *whirlwinds*, *waterspouts*, *dust-storms*, and *tornados* have their origin in substantially the same atmospheric conditions as the thunderstorm, and occur approximately at the same hours of the day.

See Kaemtz's *Meteorology* (trans. 1845); Drew's *Meteorology* (2d ed. 1860); Herschel's *Meteorology* (1861); Buchan's *Handy Book of Meteorology* (1868); Loomis' *Treatise on Meteorology* (1868); R. H. Scott's *Elementary Meteorology* (1883); Mohn's *Elements of Meteorology*; Hann's *Climatological Atlas*, and *Climatology*; Buchan's *Atmospheric Circulation* ('Challenger' Expedition); Blandford's *Meteorology of India*, &c. The leading points of this wide subject will be found under such heads as

Atmosphere.	Dust.	Hail.	Rain.
Aurora.	Earth.	Halos.	Snow.
Barometer.	Electricity.	Hygrometer.	Storms.
Climate.	Evaporation.	Lightning.	Temperature.
Clouds.	Fog.	Magnetism.	Thermometer.
Dew.	Frost.	Observatory.	Wind.

Meteors are small bodies travelling in vast numbers, and in various directions, through space. Our earth continually encounters them in its orbital path, and they are then revealed to our observation as *aërolites*, *fireballs*, and *shooting* or *falling stars*. Every night, if the sky be clear, some may be observed, on the average five to seven every hour, while on certain occasions they are so numerous as to present the spectacle of a perfect rain of fire. Besides those visible to the eye, there are numbers unseen, some of which are occasionally noted in the course of telescopic observation. The total number encountered by the earth in one day has been estimated by Professor Newton, of Yale College, United States, at 7,500,000. Their total mass, however, he estimates at only 100 tons, so that individually they must in general be exceedingly minute. They dissipate, however, a quantity of dust in the upper regions of the air, which in its slow descent and fall upon the earth is easily detected by proper means. Our air in this case acts as a shield, so that, instead of frequent showers of stones descending with deadly force, we have this quiet falling of impalpable dust. Our conclusions regarding meteors are reached by a proper interpretation of various phenomena, long considered as having no mutual connection, but now grouped coherently under one simple explanation. In order to appreciate the reasoning which has led to this result, it will be convenient to consider first the observed facts regarding (1) aërolites, (2) fireballs, and (3) shooting-stars.

The first group, *aërolites*, includes all stony or metallic masses actually falling to the earth from the sky. They have been classed as (1) aërosiderites, or siderites, chiefly consisting of meteoric iron; (2) aërosiderolites, or siderolites, conglomerates of stone and iron; (3) aërolites, almost entirely consisting of stone. The common title *aërolites* embraces, however, all kinds. The descent of such bodies, though rare, has occurred with greater frequency than would be imagined. The British Museum alone has specimens of more than three hundred, of which nearly two hundred were seen to fall. Some sacred stones, as the black stone worshipped at Emesa in Syria, the holy Kaaba of Mecca, and the great stone of the pyramid of Cholula in Mexico, owed their sanctity to a report, probably true, that they had fallen from heaven. It has been suggested that the earliest image of Diana of the Ephesians, which 'fell down from Jupiter,' had taken the place of an actual meteorite. Livy mentions the falling of a shower of stones on the Alban Mount near Rome, about 654 B.C. A Chinese catalogue records the fall of an aërolite on January 14, 616 B.C., which broke several chariots and killed ten men. Plutarch and Pliny mention a great stone, as large as a wagon, the latter says, and of a burnt colour, the fall of which, at Ægospotamos on the Hellespont about 467 B.C., is recorded in the Parian Chronicle. In 1492 A.D., 'on Wednesday, November 7,' a stone weighing 260 lb. was seen to fall near Ensisheim in Alsace: part of it is still preserved in the village church there. In 1510 about 1200 stones, one weighing 120 lb., another 60 lb., fell near Padua in Italy. We are told that the Emperor Jehangir caused a sword to be forged from a mass of meteoric iron which fell at Jullunder in the Punjab in 1620. On November 27, 1627, the astronomer Gassendi witnessed the fall of a stone weighing 59 lb. at Mount Vasier in Provence. At Wold Cottage, Yorkshire, December 13, 1795, a ploughman saw a stone of 56 lb. weight fall near him in a field. But the most interesting of such modern observations was made on April 26, 1803, near L'Aigle, in Normandy. About 1 P.M. a brilliant fireball was seen traversing the air at great speed. A violent

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explosion followed, apparently proceeding from a small, lofty, and motionless cloud, followed by the fall of a perfect shower of stones, nearly three thousand being picked up afterwards, the largest more than 8 lb. weight.

On April 20, 1876, a mass of meteoric iron more than 7 lb. weight fell at Rowton in Shropshire, accompanied also by an explosion. On September 4, 1887, a large aërolite fell at Krasnoslobodsk, in the government of Penza. It was accompanied by a loud explosion, and in it (as in some others) were found crystals having all the chemical properties of the diamond. In nearly every one of these and other cases are noticed the following features—(1) a noise, often an explosion; (2) cloud or smoke; (3) partial fusion of the mass or masses, especially *on the surface*. These indicate that the aërolite by some means is brought to a very high temperature, at least above the melting-point of iron, which often causes it to burst into fragments. Pieces of one which fell in India in 1861, though picked up miles apart, were found by Maskelyne to fit together into one whole, the fractures coinciding. This high temperature, on the *surface* of the mass, would easily be produced by the compression and friction of the air in the case of a body moving with sufficient velocity. There is no observed connection between aërolites and volcanoes, nor can volcanic agency account for their velocity, and so this simple explanation of aërial friction is now universally accepted. A sufficient velocity is at once guaranteed when we consider aërolites as simply *fireballs* whose mass and course are such as to bring them entirely through our atmosphere into contact with the earth. Meteoric iron is also alloyed with nickel, cobalt, manganese, magnesium, copper, carbon, and tin, in a manner in which it is not yet found alloyed in terrestrial minerals; and this also points to its cosmical origin. Altogether twenty-four of the terrestrial chemical elements have been found in aërolites—viz. oxygen, hydrogen, chlorine, sulphur, phosphorus, carbon, silicon, iron, nickel, cobalt, magnesium, chromium, manganese, copper, tin, antimony, aluminium, calcium, potassium, sodium, lithium, titanium, arsenic, and vanadium. No new element not found on earth has been found in them.

The second class of meteors form *fireballs*, which appear as brilliantly luminous bodies, traversing the sky, often with noise, and always with great velocity. Aërolites before their fall have often been seen as fireballs, and the substantial unity of the two classes is now almost universally accepted. Fireballs, then, are regarded as aërolites whose mass and course are such that they escape actual contact with the earth. They are much more numerous than aërolites, and are of great variety in velocity, size, and brilliance. On August 18, 1783, one of great size traversed the air over Europe, from Shetland to Rome, at a height of 50 miles and with a speed of 30 miles per second, giving off a greater light than the full moon. More recently, on November 17, 1887, a splendid specimen, seen first over the Irish Sea, crossed westwards over Ireland, at a height of probably about 20 miles, and disappeared above the Atlantic. Many hundreds of such, though usually less brilliant, have been observed. Arago enumerates 813. More are constantly being seen. Their height is obtained by comparison of observations at stations widely separated, and from it and their observed speed the actual velocity is computed. From a careful comparison of many observations made by a committee of the British Association it appears that in general they appear at a height of between 20 and 130 miles, and have a velocity of between 17 and 80 miles per second, with an average of 34·4 miles per second. Their actual size has been enormously overestimated, at 12,000 to 100 feet in diameter. The effects of irradiation and the luminous gases discharged during their course no doubt give them an *apparent* diameter enormously greater than the reality. It is probable that in most cases they are much smaller than aërolites. They generally leave behind them in their track a luminous train or 'tail' which sometimes disappears at once, and at other times persists for some minutes after the fireball itself disappears. These 'tails' are variously coloured, according probably to the different chemical constitution of the 'heads.'

That these bodies originate altogether beyond our earth is evident from several considerations. First, no sufficient terrestrial cause has been assigned. It has never been shown that volcanic explosions can communicate to ejected masses the necessary velocity. No proof has been advanced of the theory that aërolites and fireballs are condensed *in* the atmosphere itself. There is no volcanic activity on the moon, which might project such masses beyond the influence of her feebler gravity so as to enable them to fall upon our earth. Even if there were such activity in our satellite, the velocity of projection required is so great as to place such a cause outside consideration. Secondly, no good reason can be advanced *against* the theory of cosmical origin. That numerous masses, of various sizes, are in motion through interplanetary space is not in itself improbable, and is established by the investigation of the paths and velocities of shooting-stars. Thirdly, the velocity of fireballs, averaging 34·4 miles *per second*, is only comparable with such velocities as that of the earth in its orbit, which is 18·2 miles per second, or of Sirius (see STARS) in its orbit, and those of other planets and stars. It is a velocity not on the terrestrial but on the cosmical scale. Fourthly, there is no special line to be drawn between fireballs and meteors, luminous bodies of all degrees of size between the smallest meteor and the fireball having been observed. It is in fact sometimes a matter of doubt to the observer to which class he should relegate an observed example. To regard all as of common extra-terrestrial origin is then reasonable, and this view is now adopted almost universally.

We are then led onwards to the consideration of *shooting-stars*, as both the most numerous class of these appearances, and that class by observing which a satisfactory explanation of them all has ultimately been reached. On any fine night a watcher who is careful and patient for a sufficient time will see some of these, but occasionally they are much more numerous. On these occasions they are noted as originating all in one or more distinctly marked parts of the sky. From their point of origin they appear to radiate, and if it be overhead, and the meteors very numerous, the appearance is like an 'umbrella of fire' above the earth. But this point may not be overhead. It may even be below the horizon. In the latter case the meteors appear to come up over the horizon like rockets and *ascend* into the sky. This 'radiant,' as it is technically called, remains fixed among the stars, so that if at the beginning of an observation it be overhead, it will perhaps be below the horizon before the observer ceases his work. It is either named from the *constellation* in which it is placed, or indicated by its north polar distance and declination on the sphere of the heavens. Meteors from more than one radiant are frequently passing at the same time, but usually each radiant sends forth a particular kind. *Leonids* (i.e. the meteors whose radiant is in *Leo*), or the famous November meteors, are bright and swift, leaving very durable tracks of light. The *Taurids* (from constellation Taurus) give us many fireballs. Other

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radiants give meteors of special tints, or more or less disposed to giving off sparks in their course, so that each radiant is evidently the source of a family of meteors, whose characteristics are recognised at each period of activity.

Such a radiating motion implies that the meteors from one radiant move all in *parallel* courses, the curvature and radiation of their tracks being due to perspective and to projection on the *sphere* which the eye naturally assumes as the background of all celestial appearances. On the occasion of a meteoric shower the earth, therefore, is passing through a crowd of small bodies, themselves in motion, meeting or passing it on a *definite track*. We have then to ask what is the form of this meteor track—whence come and whither go the meteors we encounter in such numbers. Usually there is a tolerably definite time, recurring annually, during which a radiant is active. This was the first broad fact impressed upon observers. Although at such yearly periods the number of meteors may be very large or very small, there are at least a *few* almost always seen. From this it was early seen that certain parts of space, through which the earth passed every year, were occupied, at the date of such passage, by meteors travelling past with planetary velocities. That the meteors, as well as the earth, were in orbital movement round the sun, was soon noted (in 1834) by Professor Olmsted of Yale. He considered that the November meteors (or *Leonids*) revolved in a narrow ellipse in a period of about 182 days, and that each November the earth in its orbit passed across the outer end of this ellipse, encountering there what meteors might be in that part of their path. This theory, however, though possible in perhaps *one* case, could hardly be applied to the great number of meteor tracks which the earth crosses, as it is exceedingly improbable that so many meteor orbits would just touch the earth's orbit at their aphelion.

It was proposed, then, to regard the meteors as travelling in a *ring* round the sun, which ring the earth crossed in two parts of its annual track in August and November. Both these theories regarded the meteors as gathered into a cloud or swarm at one particular part of their orbit. When the earth chanced to cross the place of intersection at the same time as the main swarm of meteors, then a vivid display was produced, but a difference in period between the earth and main swarm caused such meetings to take place only at long intervals. Meteors, however, being distributed all along the meteor track, the earth encountered some at least in August and November every year.

This investigation received its impetus from the great display of Leonids in 1833, chiefly noted in America, and for some time remained the 'text-book explanation.' Professor H. A. Newton of Yale, showed, however, in 1864 that other great Leonid displays had taken place on twelve occasions between 902 A.D. and 1833, separated by periods of either 33·24 years or multiples of that number. He therefore predicted a grand display on November 13–14, 1866, which was duly observed. But the date of the earliest display in 902 A.D. was October 13 (O.S.), so that it was evident that the earth encountered the main swarm of Leonids about three days later in each century. From these facts Professor Newton deduced for the meteors an elliptic orbit, with a period of 354·57 days. Other explanations were possible, and that given by Schiaparelli of Milan in 1866 finally satisfied all the conditions. He treated the Leonids as revolving round the sun in a period of 33¼ years, the earth passing their orbit every year, but only encountering the main swarm when it also was passing the point of intersection. He also noted a remarkable coincidence between this orbit and that of Tempel's comet seen in 1866. In fact, they were identical, within the errors of calculation. Other similar cases were soon discovered. The Lyraïds of April 20 move in the track of a comet of 1861; Biela's comet agrees with the Andromeda meteors of November 28; the August Perseids agree with the bright comet of 1862; and now more than *seventy* such cases of agreement are known, which led Professor Tait of Edinburgh to publish the theory now generally accepted which regards comets as *consisting* of meteoric swarms (see COMET). Lockyer in 1887 showed by experiment that the fragments of fallen meteors, glowing in a very rare atmosphere given off by themselves when heated, give spectra closely resembling those of comets. It has also been shown by the same observer that what are practically the spectra of nebulæ can be obtained from the same source. So that he regards the feeble meteors of our nights as the material of nebulæ and stars—as the earliest known form of matter (see STARS). This assumes that our meteoric swarms are either remnants of the original material of the Solar System (q.v.), or portions of the greater swarms of which all space is full, which have been drawn within our solar system by planetary influence. Leverrier has shown that this latter explanation probably applies to the August and November meteors already referred to, and that the planet Uranus has most likely captured these bodies and added them to our system. The action of gravity would tend to draw out a meteor swarm so that it would gradually spread backwards and forwards until finally it would be distributed all along its track and form a closed elliptic ring. As, then, the August meteors form such a ring, while the November Leonids are a marked swarm, Leverrier concluded that the former had entered our system through the action of Uranus much earlier than the latter.

Some hundreds of 'radiants' are now known, a few of which we name, and the dates on which they are active: (1) The *Lyraïds*, April 19–20; (2) the *Pegasids*, August 10; (3) the *Perseids*, August 9–11; (4) the *Aurigids*, September and October; (5) the *Orionids*, October and November; (6) the *Taurids*, November 1–15; (7) the *Leonids*, November 13–14.

For further information readers may consult Arago's *Pop. Astronomy* (French edition only), *The Report of the Brit. Assoc. Committee on Meteors*, Chambers's *Descriptive Astronomy*, or Herschel's *Outlines of Astronomy*.

Meter. See GAS.

Methane. See DYEING.

Methodists, the name originally given, about the year 1729, by a student of Christ Church to the brothers Wesley and several other young men of a serious turn of mind, then members of different colleges of Oxford, who used to assemble together on particular nights of the week chiefly for religious conversation. The term was selected, it is believed, in allusion to the exact and *methodical* manner in which they performed the various engagements which a sense of Christian duty induced them to undertake, such as meeting together for the purpose of studying Scripture, visiting the poor, and prisoners in Oxford gaol, at *regular* intervals. Subsequently it came to be applied to the followers of Wesley and his coadjutors, when these had acquired the magnitude of a new sect; and though their founder himself wished that 'the very name,' to use his own words, 'might never be mentioned more, but be buried in eternal oblivion,' yet it has finally come to be accepted by most, if not all of the various denominations who trace their origin mediately or immediately to the great religious movement commenced by John Wesley. For an

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account of the origin and earlier development of Methodism, see articles on the brothers WESLEY and on WHITEFIELD; we confine ourselves here to a brief notice of its organisation, doctrine, and present condition.

(1) *Organisation.*—This appears to have been partly improvised by Wesley to suit the exigencies of his position. It was not a theoretical and premeditated, but a practical and *extempore* system. In the *Rules of the Society of the People called Methodists*, drawn up by himself, he says: 'In the latter end of the year 1739 eight or ten persons came to me in London, who appeared to be deeply convinced of sin, and earnestly groaning for redemption. They desired (as did two or three more the next day) that I would spend some time with them in prayer, and advise them how to flee from the wrath to come, which they saw continually hanging over their heads. That we might have more time for this great work, I appointed a day when they might all come together, which from thenceforward they did every week—viz. on Thursday, in the evening.' This he calls 'the first Methodist Society.' Its numbers rapidly increased, and similar 'societies' were soon formed in different parts of England where the evangelistic labours of the Wesleys had awakened in many minds 'a desire to flee from the wrath to come, and be saved from their sins'—the only condition required of any for admission into these societies. In order to ascertain more minutely how the work of salvation was progressing in individual cases, Wesley subdivided the societies into 'classes,' according to their respective places of abode, each class containing about a dozen persons, under the superintendence of a 'leader,' whose duties are partly religious and partly financial. He has (1) to see each person in his class once a week, 'to inquire how their souls prosper,' and to encourage, comfort, or censure, as the case may require; and (2) to collect the voluntary contributions of his class, and pay them over to the 'stewards' of the society. Each society has its stewards, who take charge of the moneys contributed in the classes and congregation, and who see to their proper distribution. The leaders and stewards are the local church-council, which is invested with disciplinary functions. A circuit is an aggregate of the societies for a particular neighbourhood; and, according to its size, having from one to five ministers appointed for a period of not less than one or more than three years. The senior minister is superintendent of the circuit. The administration of the spiritual affairs of each society is vested in the leaders' meeting, and that of the general business of the circuit in the quarterly meeting, composed of the ministers, stewards, local preachers, leaders, and trustees. These bodies invite the ministers, fix their stipends, approve or reject candidates for the ministry, review all the interests of the circuit, send memorials to the district meeting or Conference, have the right to appoint a court of appeal from the findings and verdicts of a leaders' meeting in certain cases of discipline, and to suspend for one year the operation of any new Conference law intended to be binding on the circuit or societies, until it shall have been reconsidered by the Conference. The annual assembly which governs the whole Connection is called the Conference. Down to 1784 it consisted of such of Wesley's preachers as he chose to call together to take counsel with himself; but in that year he gave it a legal constitution defining its rights over the chapels, the disciplinary control of the ministers, and their appointments. Until 1877 the Conference was composed of ministers only; but in that year a scheme of lay representation was adopted, and was brought into operation the year following. So now the Conference is in part an assembly of co-pastors, exercising mutual discipline and taking mutual counsel on all subjects specifically pastoral, and in part an assembly of 240 ministers and 240 laymen convened to deliberate on the general interests of the Connection. The pastoral session extends over a fortnight, while the mixed session finishes its business in a week. 'The legal Conference' is a body of one hundred ministers constituted and perpetuated by Wesley's Deed of Declaration, which as a matter of necessary legal form adopts and endorses all that has been done in the general Conference.

Intermediate between the Conference and the circuit are the district meetings, which are in effect provincial synods. Like the Conference itself, during the transaction of pastoral business they are composed of ministers only, while for all other business they are mixed assemblies, the ministers being joined by the circuit stewards and the laymen who have charge of foreign missions, home missions, education, chapel, and temperance affairs. In the district meeting a searching inquiry is made by the pastors into the character and administration of each, candidates for the ministry and probationers are examined, the spiritual and financial condition of the circuits is considered, and suggestions or recommendations on the points which come under review are sent up to Conference. All new legislation is sent down by the Conference to the district meetings, nor can it become law for the Connection till it has been ratified by a majority of the district meetings. The district meetings are also courts of appeal from the circuits.

(2) *Doctrine and Worship.*—Under this head not much requires to be said. Methodism is regarded by its friends as a revival of primitive Christian doctrine, fellowship, and discipline. In the beginning it set itself to combat Calvinism on the one hand, and the doctrine of baptismal regeneration on the other. Its founders held that the predestinarian element in Calvinistic divinity is opposed to the experimental theology of primitive Christianity. The Methodist preachers taught a full, free, and present salvation as the glorious privilege of every man—a theology at once experimental and evangelical, quite unlike the theology of the decrees. They taught, moreover, this conscious renewal and sanctification through faith alone in Jesus Christ. The Methodist doctrine of regeneration is through 'repentance towards God and faith towards our Lord Jesus Christ' (not through baptism); sanctification is through the saving truth spiritually received and applied by faith and obedience. The Wesleyan Methodists are evangelical Arminians. Holding the freedom of the human will, and the responsibility of man, they also maintain his total fall in Adam, and his utter inability to recover himself. They believe in the universality of the atonement, and that a dispensation of the Spirit is given to enlighten every man that cometh into the world. They insist on the necessity of men who profess to be Christians feeling a *personal interest* in the blessings of salvation—i.e. the assurance of forgiveness of sins and adoption into the family of God. This, however, is not to be confounded with a certainty of *final salvation*. They believe the Spirit of God gives no assurance to any man of that, but only of *present pardon*. In harmony with this view, they reject the doctrine of the necessary perseverance of the saints, and hold that it is fearfully possible to fall from a state of grace, and even to perish at last after having 'tasted of the heavenly gift,' and having been 'made partakers of the Holy Ghost.' They also maintain the perfectibility of Christians, or rather the possibility of their entire sanctification as a privilege to be enjoyed in this life. But Wesley 'explains'

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that 'Christian perfection does not imply an exemption from ignorance or mistake, infirmities or temptations; but it implies the being so crucified with Christ as to be able to testify, "I live not, but Christ liveth in me."' He regards the sins of a 'perfect' Christian as 'involuntary transgressions,' and does not think they should be called 'sins' at all, though he admits that they need the atoning blood of Christ. The mode of worship is elastic, ranging from the full and stately liturgical service of the Church of England, and Wesley's abridgment, to the free, spontaneous utterance of extempore prayer, the singing of four hymns, and a sermon. The more elaborate services are found principally in the large cities, the more simple in the country towns and villages. The 'love-feast' is for members only, and is held in each society once a quarter; it is a narration of vivid and inspiring experience, mingled with praise and prayer. The Covenant Service is held on the first Sabbath of the New Year. In this service the members of the church solemnly reconsecrate themselves to God, 'heartily contented that He appoint them their work and station;' covenanting to endeavour to order and govern their whole life according to the divine direction, and not to allow themselves in the neglect of anything they know to be their duty. The service concludes with the Lord's Supper.

(3) *History.*—The history of Methodism is for many years the history of Christian effort to evangelise the neglected 'masses' of England. The labours of Wesley, and of those whom he inspired to imitate his example, were of the noblest description, and met with remarkable success. The reformation of life which his preaching produced, for example, among the Kingswood colliers and the Cornwall wreckers, is a testimony to the power of religion which cannot be too highly estimated. The zeal which has inspired the body in regard to foreign missions, although in the highest degree honourable, is only the logical development of their efforts at home—for they originally regarded their society in England as simply a vast 'home mission,' and neither Wesley nor his followers desired to consider themselves a 'sect,' a new church, in the common usage of the term, but were warmly attached to the old national church, and considered themselves among her true children. When Wesley died (1791) his 'societies' had spread over the United Kingdom, the continent of Europe, the States of America, and the West Indies, and numbered 80,000 members. Since then they have largely increased (see below).

The Wesleyan Methodists have four theological colleges for the training of ministers—at Richmond Hill, Surrey; Didsbury, South Lancashire; Headingley, in Yorkshire; and Handsworth, Birmingham. They have, besides, numerous secondary schools, and also (in 1889) 841 day-schools, with 179,578 scholars; the total income of the schools being £246,478. The Methodist Book-room is situated in the City Road, London, and issues hundreds of thousands of religious publications (tracts, &c.) monthly. The newspapers and other periodicals professedly in connection with the body include four quarterlies, and about 150 journals in English and other languages. Among the more eminent Methodist authors may be named the two Wesleys, Fletcher, Benson, Clarke, Moore, Watson, Drew, Edmondson, Sutcliffe, Jackson, Treffry, Rule, Nichols, Smith, Etheridge, Rigg, Pope, Gregory, Beet, and Pearse.

THE METHODIST EPISCOPAL CHURCH is the society of Wesleyan Methodists in the United States of America, where the first members of that body—immigrants from Ireland—established themselves as a religious society in New York in the year 1766. In the course of a year or two their numbers had considerably increased, and they wrote to John Wesley to send them out some competent preachers. Two immediately offered themselves for the work, Richard Boardman and Joseph Pilmoor, who were followed in 1771 by Francis Asbury and Richard Wright. The agitations preceding the war of independence, which soon afterwards broke out, interrupted the labours of the *English* Methodist preachers in America, all of whom, with the exception of Asbury, returned home before the close of the year 1777; but their place appears to have been supplied by others of native origin, and they continued to prosper, so that at the termination of the revolutionary struggle they numbered 43 preachers and 13,740 members. Up to this time the American Wesleyan Methodists had laid no claim to being a distinct religious organisation. Like Wesley himself, they regarded themselves as members of the English Episcopal Church, or rather that branch of it then existing in America, and their 'preachers' as a body of irregular auxiliaries to the ordained clergy. 'Episcopal churches,' we are informed, 'are still standing in New York and elsewhere, at whose altars Embury, Pilmoor, Boardman, Strawbridge, Asbury, and Rankin, the earliest Methodist preachers, received the holy communion.' But the recognition of the United States as an independent country, and the difference of feelings and interests that necessarily sprang up between the congregations at home and those in America, rendered the formation of an independent society inevitable. Wesley became conscious of this, and met the emergency in a manner as bold as it was unexpected. He himself was only a presbyter of the Church of England, but having convinced himself that in the primitive church a presbyter and a bishop were one and the same order, differing only as to their official functions, he assumed the office of the latter, and, in September 1784, with the assistance of some other presbyters who had joined his movement, he set apart and ordained the Rev. Thomas Coke (q.v.), of Oxford University, bishop of the infant church. Coke immediately sailed for America, and appeared with his credentials at the Conference held at Baltimore in December of the same year. He was unanimously recognised by the assembly of preachers, appointed Asbury coadjutor bishop, and ordained several preachers to the offices of deacon and elder. Wesley also granted the preachers permission (which shows the extensive ecclesiastical power he wielded) to organise a separate and independent church under the Episcopal form of government. Nevertheless, there were not a few who were dissatisfied with the Episcopal form of government. This feeling grew stronger and stronger, until in 1830 a secession took place, and a new ecclesiastical organisation was formed, called the 'Methodist Protestant Church.' In 1842 a second secession took place, chiefly on the question of slavery—the seceders pronouncing all slave-holding sinful, and excluding slaveholders from church membership and Christian fellowship; and in 1843 a meeting was held at Utica, New York, where a new society was constituted and named the 'Wesleyan Methodist Connection of America.' It has continued up to the present a small and unimportant body. But in 1844 a far larger and more important secession took place on the same question, when the whole of the Methodist societies in the then slave-holding states, conceiving themselves aggrieved by the proceedings instituted at the general Conference of New York (1844) against the Rev. James O. Andrew, D.D., one of the bishops, and a citizen of Georgia, who had married a lady possessed of slaves, resolved to break off connection with their northern brethren. Hence originated the Methodist Episcopal Church, South. In 1869 a movement (unsuccessful) began

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in favour of the re-union of the northern and southern Methodist Episcopal Churches, slavery, the main obstacle in the way, having been finally abolished. There are now 10 theological schools, nearly 50 colleges and universities, and a great number of other educational institutions belonging to the body in America, with some 30,000 students. The publications of the church, managed by a General Book Committee, extend to far above 200,000,000 pages of books and tracts in a year; while in its foreign missions more than 3000 American missionaries are employed.

Returning to the English Wesleyan Methodists, we mention the various secessions from the parent body in the order of time. (1) *The Methodist New Connection.*—This society detached itself from the older one in 1797. Its doctrines and order are the same, the only difference being that it admits one layman to each minister into the Conference, and allows them to share in the transaction of all business, both secular and spiritual. These laymen are chosen either by the circuits or by 'guardian representatives' elected for life by the Conference. (2) *Primitive Methodists*, vulgarly designated *Ranters*, were first formed into a society in 1810, though the founders had separated from the old society some years before. The immediate cause of this separation was a disagreement as to the propriety of camp-meetings for religious purposes; and also upon the question of women being permitted to preach. A third point of difference is the admission to their conference of two lay delegates for every minister. (3) *Independent Methodists*, who separated in 1810. They are chiefly distinguished by their rejection of a paid ministry. (4) *Bible Christians*, also called *Bryanites*, were formed by a local preacher named Bryan, who seceded from the Wesleyans in 1815. The only distinction between them and the original body appears to be that the former receive the eucharistic elements in a sitting posture. (5) *United Free Church Methodists* have been formed by the amalgamation of two sects of nearly equal numerical strength. The older of these, called the Wesleyan Association, originated in 1836 in the removal of one or two influential ministers from the original Connection. Points of difference subsequently appeared with regard to the constitution of the Conference.—The younger sect, called the Wesleyan Reform Association, took its rise in 1849 through the expulsion of several ministers from the parent body on a charge of insubordination, and, being founded on the same principles as the last-mentioned community, arrangements were entered into for their union, which was subsequently effected in 1857. Church independency and freedom of representation in the annual assembly are two of the most prominent distinctive traits in the organisation of the United Methodist Free Church.

The WELSH CALVINISTIC METHODISTS are not a secession from the followers of Wesley, but originated partly in the preaching of his friend and fellow-evangelist, Whitefield, and partly in that of Howel Harris. Whitefield was a Calvinist; Wesley, as we have seen, was on some points decidedly Arminian. A difference arose between them on the subject of election. Henceforward their paths lay in different directions. Whitefield, however, did not form a religious sect; and after his death (1770) his followers, being left without any distinct bond or organisation, either followed the leading of the Countess of Huntingdon (q.v.), or became distributed among other denominations, a large portion, especially in Wales, becoming absorbed in the new society gradually forming itself through the preaching of Howel Harris and his coadjutors. They became a separate body in 1810, and have now about 130,000 communicants.

The total number of members and adherents of Methodist churches is estimated at 25,000,000; the following table shows the distribution of ministers and members in 1889:

	Ministers.	Members.
Wesleyan Methodists—		
Great Britain	1,975	514,790
Ireland	234	25,960
Foreign Missions	375	37,778
French Conference	30	1,541
South African Conferences	173	36,876
West Indian Conferences	89	48,082
Australasian Conferences	605	78,060
Methodist New Connection—		
England	181	33,439
Ireland	8	1,013
Missions	7	1,495
Bible Christians—		
England	179	26,646
Australia, &c.	89	5,759
Primitive Methodists—		
England and Missions	1,088	194,374
United Methodist Free Churches—		
Home Districts	340	74,108
Foreign Districts	69	11,356
Wesleyan Reform Union	14	8,683
Independent Methodists	..	6,065
United States, Episcopal Churches—		
Methodist Episcopal Church, North	14,135	2,098,985
Methodist Episcopal Church, South	4,530	1,102,926
African Methodist Episcopal Church	2,550	405,000
African Methodist Epis. Zion Church	2,110	314,000
Coloured Meth. Epis. Church of America	1,729	165,000
Evangelical Association	1,121	137,697
United Brethren Church	1,566	196,278
Union American Meth. Epis. Church	40	3,660
United States, Non-Episcopal Churches—		
Methodist Protestant Church	1,570	129,263
Other non-Episcopal Churches	2,502	61,314
Canada, Methodist Church of	1,558	212,770
Total	38,817	5,926,863

See, besides the works and the Lives of the Wesleys and of Whitefield, George Smith's *History of Methodism* (1862); Abel Stevens' *History of the Religious Movement called Methodism* (New York, 1861); Daniel's *Short History of the Methodists* (1882); and works on the polity, constitution, and economy of Methodism by Pierce, Williams, and Rigg. For Methodist missions, see MISSIONS.

Methodius. See CYRIL.

Methuen Treaty, a commercial treaty negotiated in 1703 by Paul Methuen, the English ambassador in Portugal, with that country, to admit Portuguese wines to England at a duty one-third less than that on French wines, the Portuguese undertaking in return to admit English wool, imposing on it, however, the old duty of 23 per cent. *ad valorem*. It was annulled in 1835.

Methyl is an organic radical homologous with Ethyl (q.v.). Its formula is CH_3, but, as it cannot exist in the free state, two such groups of atoms unite together to form ethane, $CH_3—CH_3$. As in the case of ethyl, methyl is the centre of a whole group of substances known as the methyl-group. Thus, the hydride of methyl, CH_3H, known as light carburetted hydrogen, marsh-gas, or fire-damp, is well known as the cause of explosions in coal-mines. It is a light, inodorous gas, half as heavy as air; non-poisonous and very inflammable, forming an explosive mixture with seven volumes of air. Methyl alcohol, CH_3OH, is obtained as a by-product in the manufacture of beet-root sugar, and also by the dry distillation of wood. It is a colourless, mobile liquid, resembling ordinary alcohol in many of its properties. Methyl oxide or methyl ether, $(CH_3)_2O$, corresponding to ethyl ether or common ether, is a gas at ordinary temperatures, very soluble in water and alcohol, and capable of being condensed to a liquid by pressure and cold. It is largely prepared for use in freezing-machines, owing to the intense cold which results when the liquefied gas is allowed to evaporate. It is prepared by the action of sulphuric acid on wood spirit.

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Besides the above, methyl enters into the constitution of many ethereal salts and amines, such as methyl chloride, acetate, and salicylate, as well as methyl amine, dimethyl amine, &c. (see AMINES). The salicylate, $CH_3C_7H_5O_3$, is interesting as being the ethereal oil of *Gaultheria procumbens*, from which pure methyl alcohol and pure salicylic acid can both be made. For Methyl Violet, see DYEING; and for Methylene, see ANÆSTHESIA.

Methylated Spirit consists of a mixture of 9 parts of alcohol, of specific gravity 0·920, with 1 part of Pyroxylic (q.v.) or wood-spirit. This addition of wood-spirit renders it unfit for drinking, although it scarcely interferes with its power as a solvent. It is allowed by the excise to be sold duty-free for manufacturing purposes, and for preserving specimens in museums.

Metonic Cycle. See CHRONOLOGY, GOLDEN NUMBER.

Metope. See ENTABLATURE.

Metre is that regulated succession of certain groups of syllables in which Poetry (q.v.) is usually written. A greater or less number of groups forms a *line* or *verse*, and in modern languages the verses usually rhyme with one another; but this is not at all essential to the notion of metre. In the classic languages metre depended upon the way in which long and short syllables were made to succeed one another. English metre depends, not upon the distinction of long and short, but upon that of *accented* and *unaccented* syllables. Thus, in the lines,

The cur'|few tolls' | the knell' | of part'|ing day'—
War'riors and | chiefs', should the | shaft' or the | sword'—

the accents occur at regular intervals; and the groups of syllables thus formed constitute each a metre or measure. The groups of long and short syllables composing the metres of classic verse were called *feet*, each foot having a distinctive name. The same names are sometimes applied to English measures, an accented syllable in English being held to be equivalent to a long syllable in Latin or Greek, and an unaccented syllable to a short. Every metre in English contains one accented syllable and either one or two unaccented syllables. As the accent may be on the first, second, or third syllable of the group, there thus arrive five distinct measures, two dissyllabic and three trisyllabic, as seen in the words—1, com'fort (corresponding to the classic Trochee); 2, agree' (Iambus); 3, mur'muring (Dactyl); 4, confu'sion (Amphibrach); 5, colonnade' (Anapæst). These measures are arranged in *lines* or *verses*, varying in length in different pieces, and often in the same piece. The ending measure of a line is frequently incomplete, or has a supernumerary syllable; and sometimes one measure is substituted for another. All that is necessary is that some one measure be so predominant as to give a character to the verse. Constant recurrence of the same measure produces monotony. The following lines exemplify the five measures:

(1) Rich' the | treas'ure.
Bet'ter | six'ty | years'of | Eu'rope | than'a | cy'cle | of' Ca|thay'.

(2) Aloft' | in aw'|ful state'.
The prop'|er stud'|y of' | mankind' | is man'.

(3) Bird' of the | wil'derness.
Bright'est and | best' of the | sons' of the | morning.

(4) The dew' of | the morn'ing.
O young' Loch|invar' has | come out' of | the west'.

(5) As they roar' | on the shore'.
The Assyr'|ian came down' | like a wolf' | on the fold'.

It is instinctively felt that some of these measures are better suited for particular subjects than others. Thus, the first has a brisk, abrupt, energetic character, agreeing well with lively and gay subjects, and also with the intensity of such pieces as *Scots wha ha'e*. The second is by far the most usual metre in English poetry; it occurs, in fact, most frequently in the ordinary prose-movement of the language. It is smooth, graceful, and stately; readily adapting itself to easy narrative, and the expression of the gentler feelings, or to the treatment of severe and sublime subjects. The trisyllabic metres, owing to the number of unaccented syllables in them, are rapid in their movement, with a tripping lightness that suggests the analogy of music in triple time. They are all less regular and monotonous than the dissyllabic metres. One of them is frequently substituted for another, as in the opening of Byron's *Bride of Abydos:*

Know' ye the | land' where the | cy'press and | myr'tle
Are em'blems | of deeds' that | are done' in | their clime';
Where the rage' | of the vul'|ture, the love' | of the tur'|tle—

where each of the three lines is in a different metre, the first dactylic, the second amphibrachic, the third anapæstic. In addition to this irregularity, one of the unaccented syllables is often wanting; as in Mrs Hemans' poem, *The Voice of Spring:*

I come', | I come'! | ye have called' | me long';
I come' | o'er the moun'|tains with light' | and song'—

the first line has only one measure of three syllables, although the general character of the versification is trisyllabic.

In a kind of verse introduced by Coleridge, and used occasionally by Byron and others, the unaccented syllables are altogether left out of account, and the versification is made to depend upon having a regular number of accents in the line:

There is' not wind' enough' to twirl'
The one' red leaf', the last' of its clan',
That danc'es as oft'en as dance' it can'
On the top'most twig' that looks up' at the sky'.

Here there are four accents in each line, but the number of syllables varies from eight to eleven.

The variety of combinations of metres and rhymes that may be formed is endless; but a few of the more usual forms of English versification have received special names, and these we may briefly notice.

Octosyllabics are verses made up each of four measures of the second kind of metre, and therefore containing eight syllables:

With fruit'|less la'|bour, Cla'|ra bound'
And strove' | to stanch' | the gush'|ing wound'.

Scott's and Byron's romantic poems (save *Lara* and the *Corsair*) are mostly in octosyllabics, and so are *Hudibras*, *Lalla Rookh*, and many other pieces.

Heroic is a term applied to verses containing *five* metres of the second kind, or ten syllables. Heroics either rhyme in couplets, or are without rhymes, constituting blank verse. Many of the chief narrative and didactic poems in the English language are in rhyming heroics; as those of Dryden, Pope, Cowper, &c. Milton's two great poems, Young's *Night Thoughts*, Thomson's *Seasons*, Cowper's *Task*, Wordsworth's *Excursion*, and many others are written in blank heroics. Metrical dramas are almost always in blank verse; in which case there is frequently a supernumerary syllable, or even two, at the end of the line:

To be, | or not | to be, | that is | the ques|tion:
Whether | 'tis no|bler in | the mind | to suf|fer.

Two trochaic measures are in use in English, the fifteen-syllable and the seven-syllable. Of the former the best example is Tennyson's *Locksley Hall;* the latter was a favourite form with Keats, as in the *Ode on the Poets* and *Mermaid Tavern*, and of Shelley, as in the *Lines Written in the Euganean Hills.*

In *Elegiacs* the lines are of the same length and

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the same measure as in heroics, but the rhymes are alternate, and divide the poem into quatrains or stanzas of four lines, as in Gray's *Elegy*. The Spenserian stanza, popularised by Spenser in the *Faerie Queene*, and much used by Byron, differs from common heroics only in the arrangement of the rhymes, and in concluding with an Alexandrine which gives it a sonorous cadence particularly pleasing to the ear. The Chaucerian heptastich is a seven-line decasyllabic stanza called also *rime royal*, having three rhymes, one connecting the first and third; another, the second, fourth, and fifth; and the third, the sixth and seventh.

The octosyllabic quatrain, the quatrain in eights and sixes, and the quatrain in sixes, with the third line octosyllabic, are commonly called long measure, common measure, and short measure. The second has been also called *service metre*, being the form of versification adopted in the metrical Psalms, in many hymns, and other lyrical pieces. From being frequently employed in old romances and ballads, this metre is also called *ballad metre*. A familiar example is Chaucer's *Rime of Sir Thopas*. The first and third lines often rhyme, as well as the second and fourth.

In triple measures the most important are the quatrain, the six-line and the eight-line stanzas. Each may be dactylic, anapæstic, or amphiambic, but the last is the most common; of the first an example is Byron's *Song of Saul before his last Battle;* of the second, Wolfe's *Burial of Sir John Moore;* of the third, in many ballads and songs, as in the line:

I saw' from | the beach' when | the morn'ing | was shin'ing.

The unrhymed metres are hexameters, blank verse, and choral metres, sometimes, as in *Queen Mab*, iambic; in the *Strayed Reveller*, trochaic.

Such are some of the more usual and definite forms of versification. In many poems, especially the more recent ones, so much licence is assumed that it is difficult to trace any regular recurrence or other law determining the changes of metre, or the lengths of the lines; the poet seeks to suit the modulation at every turn to the varying sentiments. But it may be questioned whether much of this refinement of art is not thrown away, upon ordinary readers at least, who, failing to perceive any special suitableness, are inclined to look upon those violent departures from accustomed regularity as the results of caprice.

See also the special articles in this work on ACCENT, ALLITERATION, BLANK VERSE, HEXAMETER, ODE, POETRY, QUANTITY, RHYME, and SONNET; Edwin Guest's *History of English Rhythms* (2d ed. revised by Prof. Skeat, 1882); Prof. J. B. Mayor's *Chapters on English Metre* (1886); Dr Gummere's *Handbook of Poetics* (Boston); and Prof. Schipper's *Englische Metrik* (Bonn, 1881–89).

Mètre, the basis of the 'metrical' or modern French system of weights and measures, and the unit of length. The first suggestion of a change on the previous system dates as far back as the time of Philip the Fair; but up till 1790 no important change had been effected. On the 8th May 1790 proposals were made by the French government to the British, for the meeting of an equal number of members from the Academy of Sciences and the Royal Society of London, to determine the length of the simple pendulum vibrating seconds in N. lat. 45° at the level of the sea, with the view of making this the unit of a new system of measures. The British government, however, did not give this proposal a favourable reception, and it fell to the ground. The French government, impatient to effect a reform, obtained the appointment by the Academy of Sciences of a commission composed of Borda, Lagrange, Laplace, Monge, and Condorcet, to choose from the following three, the length of the pendulum, the fourth part of the equator, and the fourth part of the meridian, the one best fitted for their purpose. The commission decided in favour of the last—resolving that the $\frac{1}{10000000}$th of a quadrant of the Meridian (q.v.) be taken for the basis of the new system, and be called a 'mètre.' Delambre and Mechain were immediately charged with the measurement of the meridian between Dunkerque and Barcelona; and the result of their labours was referred to a committee of twenty members, nine of whom were French, the rest having been deputed by the governments of Holland, Savoy, Denmark, Spain, Tuscany, and the Roman, Cisalpine, Ligurian, and Helvetic republics. By this committee the length of the mètre was found to be 443·296 Parisian lines, or 39·3707904 English inches; and standards of it and of the kilogramme (see GRAMME) were constructed, and deposited among the archives of France, where they still remain. If we call the mètre 3 feet 3⅜ inches our error will be $\frac{1}{1000}$ inch only. The 'metrical system' received legal sanction 2d November 1801. The following are the fractions and multiples of the mètre:

	English Inches.		English Feet.		English Yards.
Millimètre,	·0393707904				
Centimètre,	·393707904				
Decimètre,	3·93707904				
MÈTRE,	39·3707904	=	3·2808992	=	1·093633
Decamètre,	393·707904	=	32·808992	=	10·93633
Hectomètre,	3937·07904	=	328·08992	=	109·3633
Kilomètre,	39370·7904	=	3280·8992	=	1093·633
Myriamètre,	393707·904	=	32808·992	=	10936·33

The term 'metric system' is also extended to the French square measure based on the Arc (q.v.), which is a square the side of which is a mètre; to the measure of weight based on the Gramme (q.v.), which is the weight of a cubic decimètre of distilled water; to the measure of capacity based on the Litre (q.v.), the volume of a cubic decimètre; and to the cubic measurement based on the Stère (q.v.), which is a cubic mètre. See DECIMAL SYSTEM.

Metronome, a small machine for indicating the correct time or speed at which a musical composition should be played. It is essentially an inverted pendulum moved by clockwork. The time is regulated by a weight which can be pushed up and down the pendulum rod, on which is a graduated scale. The metronome as we have it was patented by Mälzel in 1816, but was really invented by Winkel of Amsterdam.

Metropolitan. See ARCHBISHOP, COLONY.

Metternich, CLEMENS WENZEL NEPOMUK LOTHAR, Prince von Metternich and Duke of Pontella, an eminent Austrian diplomatist, was born at Coblenz, 15th May 1773. His ancestors had obtained distinction in the wars of the empire against the Turks; his family had supplied more than one elector to the archbishoprics of Mainz and Treves; and his father, Franz Georg Karl, Count von Metternich, had secured a high reputation as a diplomatist and as the associate of Kaunitz. Young Metternich therefore entered the service of his country under the most favourable auspices, of which he was not slow in taking advantage. At the age of fifteen he matriculated at the university of Strasburg, where he had for his fellow-student Benjamin Constant, and from which he removed, two years afterwards, to Mainz to complete his education. In 1794, after a short visit to England, he was attached to the Austrian embassy at the Hague, in the following year marrying the granddaughter and heiress of his father's friend Kaunitz. He first came into notice at the congress of Rastadt, where he represented the Westphalian nobility, after which he accompanied Count Stadion to St Petersburg. From this point his rise was very rapid, as he added to the advantages of his birth and connections a more than

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ordinary share of diplomatic ability, with the most graceful and winning manners. At twenty-eight he was appointed Austrian minister at the court of Dresden, and after the lapse of two years he was sent as ambassador to Berlin, where he took a leading part in the well-known coalition which was dissolved by the battle of Austerlitz. After the peace of Presburg young Metternich was selected for the most important diplomatic appointment in the gift of the emperor—that of minister at the court of Napoleon. When he presented himself before the emperor, he was greeted with the remark, 'You are very young to represent so powerful a monarchy.' 'Your majesty was not older at Austerlitz,' replied Metternich, with a slight exaggeration which could not make the compliment less acceptable; and, indeed, young as he was, he exhibited an address and a knowledge before which Napoleon might bluster, but of which he never could get the better. Without much ardour, with very limited sympathies, with no deep convictions, he had a clear head and a firm hand; he could keep his own secret, and he could worm out the secrets of others; and, making himself the most agreeable man in the world, he plotted with a smiling countenance, manœuvred in a dance, and struck the hardest when he seemed to yield the most.

In 1807 he concluded the treaty of Fontainebleau, very favourable to the interests of Austria; and on the outbreak of the war between France and Austria in 1809 he was detained some time before he could obtain his passport. In the course of that year he succeeded Count Stadion as minister of Foreign Affairs, and it was during his tenure of office that he conceived the idea of a marriage between Napoleon and an Austrian archduchess as a means of purchasing a respite for the empire. Metternich escorted Marie Louise to Paris. Amidst the difficulties of 1812–13 Metternich maintained at first a temporising policy, but the obstinacy of Napoleon at length led him to resolve upon the declaration of war with France made in August 1813. In the autumn of that year the grand alliance was signed at Teplitz, and Metternich, in recognition of his great ability in connection with the negotiations, was raised to the dignity of a prince of the empire. In the subsequent conferences and treaties the newly-created prince took a very prominent part, and he subsequently signed on behalf of Austria the second treaty of Paris on 20th November 1815. He afterwards paid a visit to England, and was made an LL.D. by the university of Oxford—the only honour this man of countless orders ever received from Britain. After this he still continued to conduct the diplomacy of Austria; in 1821 he was appointed chancellor of the empire, and in 1826 succeeded Count Zichy as president of ministerial conferences on home affairs. His efforts were now earnestly directed to the maintenance of peace in Europe and the preservation of the existing state of things in the Austrian dominions by the strictest measures of police and severe despotism. In the mildest expressions of individual opinion he saw symptoms of dangerous agitation, and his supreme object was to combine what he called the conservative forces of society against anarchy. Then came the French Revolution of 1848, and Metternich's hatred of revolution was fanatical. The shock, which overturned for a time half the thrones of Europe, was felt at Vienna, and the government fell, in spite of the resistance of Metternich, who maintained his policy of 'thorough' to the last. Leaving Vienna with an escort of cavalry, he fled to England, and there he remained till 1851, in the autumn of which year he made a sort of royal progress to his castle of Johannisberg on the Rhine. From this time, although the advice of the old statesman was occasionally asked by the emperor, he was never again requested to assume office. He died at Vienna on 11th June 1859. The *Autobiography* of Metternich (French, 1879–82; German, 1880–84; Eng. trans. 1880–83), edited by his son, throws valuable light on the stirring times in which he lived. In these volumes also appears the diary of his third wife, Countess Melanie Zichy-Ferraris, whom he married in 1831, when he was about fifty-eight years of age. She was a clever and beautiful woman, and gave her husband much effective aid. From many entries in her diary it is evident that, if her husband was stern and harsh in political strife, he was not without warm and genial affections. To her Prince Metternich was as good and great a man as ever lived, and she expresses more than once her opinion that he alone 'could save the world.'

There are works on Metternich by Binder (1836), Gross-Hoffinger (1846), Schmidt-Weissenfels (1861), Beer (1877); and see *Metternich*, by Colonel Malleson ('Statesmen' series, 1888).

Mettray, a village of France, 5 miles N. of Tours by rail, noted for its great agricultural and industrial Reformatory (q.v.), the parent of all such institutions. It dates from 1839, and in 1886 had 537 inmates.

Mettrie. See LAMETTRIE.

Metz, the strongest fortress of German Lorraine (before 1871 the principal bulwark of the north-eastern frontier of France, and capital of the department of Moselle), stands on the river Moselle at the influx of the Seille, 216 miles E. of Paris. The strength of the place consists in its exterior defences, of which the principal are a cordon of forts, some greatly strengthened and improved since the German annexation, and some entirely new. The cathedral, a Gothic edifice (14th to 16th century), is remarkable for its vast size and its architectural lightness, and has a beautiful spire of open work, 363 feet in height. Of other seven Catholic churches, the most interesting is St Vincent's. There are two Protestant churches and a synagogue. The city has a library, a museum, a military academy, a music school, art and numismatic collections, &c. Apart from tanning and the making of saddles and shoes, there are few industries, though there are several iron-works in the vicinity. The trade is chiefly in wine, brandy, preserved fruits, leather, &c. Pop., which in 1869 was 48,325, had in 1875, by reason of emigration into France, decreased to 37,925, or with garrison, 45,856; (1890) 59,723, including a large garrison. The Protestants are less than half as numerous as the Catholics. Metz, known to the Romans as *Divodurum*, was afterwards called Mettis (corrupted from Mediomatrici, the name of the people), hence the present form. Under the Franks it was the capital of Austrasia, and in 870 passed to the empire; it was afterwards made a free city of the empire. In 1552 it was treacherously taken possession of by the French; and, although Charles V. besieged the place from October 1552 to January 1553, they kept it till it was formally ceded to them in 1648. The fortifications, already strong, were completely reconstructed by Vauban in 1674; they were added to at various dates, and after 1830 thoroughly restored. In August 1870 Bazaine was compelled to retire with his army into Metz, which after a long siege was taken by the Germans (see FRANCE, Vol. IV. p. 782); by the treaty of Frankfort it was annexed to Germany.

See histories of the town by Coster (1871) and Westphal (3 vols. 1875–77); and the account of the warlike operations of 1870 by the German staff (1872). Compare also BAZAINE.

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Meudon, a village 5 miles W. of Paris by the railway to Versailles. The château, rebuilt by Mansard for the Dauphin in 1695, and fitted up for Marie Louise by Napoleon in 1812, was reduced to ruin during the bombardment of Paris in 1871. The Forest is a favourite holiday resort. A chapel, dedicated to Notre Dame des Flammes, commemorates the terrible railway accident of May 1842, in which over 100 persons were burned alive. Rabelais was curé of Meudon. Pop. 7570.

Meulebeké, a town in the Belgian province of West Flanders, on the Mandel, a tributary of the Lys, 24 miles SW. of Ghent. Pop. 9063.

Meulen, ADAM (not ANTOINE) FRANÇOIS VAN DER, Flemish painter, born at Brussels, 11th January 1632 (not 1634), was appointed by Colbert in 1666 battle-painter to Louis XIV., and thenceforward accompanied that king in his military expeditions. A long series of Van der Meulen's battle-pictures hang in the Louvre. He died in Paris, 15th October 1690.

Meung, JEAN DE, or Jean Clopinel, a French satirist, the Voltaire of the middle ages as Gaston Paris calls him, was born at Meun-sur-Loire about 1250. He flourished under Philip the Fair, translated many books into French, became rich and prosperous, and died before November 1305. His *Testament*, in single-rimed quatrains, with all its raillery, reveals a genuine piety. But his great work is his continuation to the length of 22,817 lines of the *Roman de la Rose*, left unfinished in 4670 lines by William of Lorris before 1260. He preserved the original metre, but completely altered the treatment, substituting for its tenderness, refinement, and elaborate allegorising, sharp satirical pictures of actual life, forming an invaluable mirror of the middle ages. See *Hist. Litt. de la France*, vol. xxviii.

Meursius, JOHANNES, the elder (properly Jan de Meurs), a learned scholar, was born at Loozduinen near the Hague, 9th February 1579, studied philology at Leyden, next travelled through Europe with the son of the Grand-pensionary Barneveldt, and became in 1610 professor of History, and next year of Greek, at Leyden, and afterwards Historiographer to the States-general. In 1625 he became professor of History in the academy at Sorö in Denmark, and here he died, 20th September 1639. His industry was portentous, and his works are a storehouse of materials for students, especially in Greek antiquities. He edited Cato's *De Re Rustica*, Plato's *Timæus*, the *Characters* of Theophrastus, and a long series of the writings of the later Greek writers, as Lycophron, Constantinus Porphyrogenitus, Philostratus, Aristoxenus, Constantinus Manasses, Theophylact, Theodorus Metochites, Antigonus Carystius, Apollonius Dyskolus, and Phlegon. Other works are the useful *Glossarium Græco-Barbarum* (1614), *Res Belgicæ* (1612), *Athenæ Batavæ* (1625), *Historia Danica* (1630), and a long series of monographs on questions of Greek antiquities which may be found in the *Thesaurus Antiquitatum Græcarum* of Gronovius. A collected edition of his works was prepared by Lami (12 vols. Flor. 1741–63).—His son, JOHANNES MEURSIUS, the younger, was born at Leyden in 1613, and died in Denmark in 1654. He wrote several antiquarian works of value, but his name by a singular misfortune survives in connection with the filthy *Elegantiæ linguæ Latinæ* (best ed. Leyden, 1757), with which it is certain that he had nothing to do. The original edition bears neither place nor date, but was most probably printed about 1680 at Lyon or Grenoble. It contains a little poem by Chorier (1609–92), hence his name has been too easily connected with the book, the origin of which still remains an unsolved puzzle.

Meurthe-et-Moselle, a department in the north-east of France, formed, after the treaty of 1871 with Germany, out of what remained of the former departments of Moselle and Meurthe. It has four arrondissements—Briey, Lunéville, Nancy, and Toul—an area of 2020 sq. m., and a pop. (1872) of 365,137; (1886) 431,693. The capital is Nancy. The department belongs to the plateau of Lorraine, has very fertile soil, producing corn, wine, potatoes, fruit, beet-root for sugar, hops, &c., and is drained by the Moselle and its tributaries. It has valuable iron-mines, and is the first department in France for iron and steel, and the third for glass; there are also important manufactures of pottery, woollens, cottons, chemicals, tobacco, paper, beer, artificial flowers, and embroidery-work. Rock-salt is mined in large quantities. In point of popular education it ranks second amongst the French departments, Doubs being first.

Meuse (Dutch *Maas*), an affluent of the Rhine, rises in the French department of Haute-Marne, flows in a northerly direction in a deep, narrow, winding valley, past Verdun and Sédan, entering Belgium just below Givet, on to Namur, whence it makes a huge curve to the east, then flows north past Liége and Maestricht, and, bending abruptly to the west, finally joins the Waal, one of the mouths of the Rhine, from the left opposite Gorkum. The united streams take the name of the Maas, which soon divides again. The southern branch passes through the Biesbosch and Hollandsche Diep, and, again dividing, reaches the sea in two wide estuaries, Haringvliet and De Krammer. The northern branch, called the Merwede as far as Dordrecht and to the west of that town the Old Maas, likewise reaches the sea in two channels, the Old and the New Maas. On this last stands Rotterdam. The entire river is 500 miles in length; it is navigable from Verdun. Area of basin, 18,530 sq. m. Its principal affluents are the Sambre on the left and the Ourthe on the right.

Meuse, a department in the north-east of France, touching Belgium in the north. Area, 2404 sq. m.; pop. (1872) 284,725; (1886) 291,971. The surface is traversed from south-east to north-west by the wooded Argonne ranges, which form the right and left bank of the river Meuse, and separate it from the basin of the Seine on the west and from that of the Moselle on the east. The soil in the valleys is fertile and well cultivated. Wheat, oats, beet-root (for sugar), hemp, oil-plants, and wine (nearly 9,000,000 gallons annually) are the principal products. Iron is mined and manufactured; glass and paper are the chief branches of industry. The four arrondissements are Bar-le-Duc, Commercy, Montmédy, and Verdun. The capital is Bar-le-Duc.

Mexico, the most southerly country of North America, is a federal republic, embracing twenty-seven states, a federal district, and two territories. It extends between the United States and Guatemala, with an extreme length of nearly 2000 miles; its breadth varies between 1000 and (in the Isthmus of Tehuantepec) 130 miles. It has a coast-line of almost 6000 miles, but with scarcely a safe harbour beyond the noble haven of Acapulco; on the Atlantic side, with its sandbanks and lagoons, there are only open roadsteads, or river-mouths closed to ocean vessels by bars and shallows; harbour-works, however, were in active construction at Vera Cruz and Tampico in 1890. From the south-eastern and north-western extremities of the republic there extend the peninsulas of Yucatan and Lower California, enclosing the Gulfs of Campeche and California respectively. The islands of Mexico are few and of no importance.

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In area Mexico almost equals Great Britain and Ireland, France, Germany, and Austria-Hungary together. The figures given in the following table are official, but in most cases they can be accepted only as approximate: large sections of Michoacán and Guerrero, and also of Sonora, have not yet been explored; and there are still many Indians that have never even come in contact with the white man. Of the entire population the whites are estimated to form 19 per cent., the Indians 38, and the half-castes (*mestizos*) 43 per cent.

States.	Sq. Miles.	Pop. in 1888.	Chief Towns.
NORTHERN—			
Sonora	77,526	106,391	Hermosillo.
Chihuahua	89,269	298,073	Chihuahua.
Coahuila	59,290	177,797	Saltillo.
Nuevo Leon	25,090	244,052	Monterey.
ATLANTIC—			
Tamaulipas	29,336	167,777	Ciudad Victoria.
Vera Cruz	24,248	633,369	Jalapa.
Tabasco	9,843	114,028	S. Juan Bautista.
Campeche	20,844	91,180	Campeche.
Yucatan	28,178	275,506	Merida.
PACIFIC—			
Sinaloa	36,180	223,684	Culiacán.
Jalisco	27,261	1,161,709	Guadalajara.
Colima	2,704	69,547	Colima.
Michoacán	23,160	801,913	Morelia.
Guerrero	22,863	331,827	Chilpancingo.
Oaxaca	28,775	793,419	Oaxaca.
Chiapas	29,722	269,710	San Christobal.
CENTRAL—			
Durango	42,526	265,931	Durango.
Zacatecas	25,227	526,066	Zacatecas.
Aguas Calientes.	2,896	121,726	Aguas Calientes.
San Luis Potosí.	25,987	546,447	San Luis Potosí.
Guanajuato	12,545	1,007,116	Guanajuato.
Queretaro	3,937	213,525	Queretaro.
Hidalgo	7,735	494,212	Pachuca.
Mexico	8,284	778,969	Toluca.
Morelos	1,650	151,540	Cuernavaca.
Puebla	12,788	839,468	Puebla.
Tlaxcala	1,506	147,988	Tlaxcala.
Federal District	463	451,246	Mexico.
Lower California	59,907	34,668	La Paz.
Tepic	11,580	102,166	Tepic.
Total	751,269	11,487,210	

There are separate articles in this work on most of the states and chief towns.

Surface.—For the most part Mexico consists of an immense tableland, which commences in the United States as far north as Colorado, and gradually rises to over 8100 feet at Marquez (the highest point touched by the railway), 76 miles N. by W. of Mexico city; and a mean elevation nearly as great is maintained in all the south central plateau: at El Paso, on the northern frontier, the elevation is only 3717 feet. The prevailing formations are metamorphic, but partly overlaid by igneous rocks of every geologic epoch, rich in metalliferous ores. In the highest ranges granites and other igneous rocks prevail, with deposits of sulphur and pumice, and other recent volcanic discharges. In the north chalk and sandstones become prevalent. The escarpments of this plateau form most of the so-called Cordilleras; Humboldt's theory of a continuous chain extending from Patagonia to Alaska has now been abandoned. The most important range is the Sierra Madre (over 10,000 feet, and extending from Tehuantepec into the United States); parallel with this run the sierras of the east coast and of Lower California. The surface of the country is also much broken up by short cross-ridges and detached peaks, the principal being the Cordillera de Anahuac (q.v.), culminating in Nevado de Tolúca (19,454 feet), the highest point on the North American continent, and Popocatepetl (17,523). The Pico de Orizaba, east of Popocatepetl, is 18,205 feet high. Most of the Mexican volcanoes are extinct or quiescent, and violent earthquakes are of rare occurrence. No disturbance so remarkable has occurred since the upheaval of Jorullo (q.v.) in 1759. On the Atlantic side the plateau descends abruptly to the narrow strip (about 60 miles) of gently sloping coast-land; towards the Pacific, where the coast-lands vary in width from 40 to 70 miles, the descent is more gradual. Of the present lakes the only one of great size is Chapala (q.v.), which is traversed by the Rio Grande de Santiago; but considerable bodies of water collect in depressions in the uplands during the heavy rains, and even flood the surrounding country for a time. The rivers of Mexico are of little use for navigation. South of the Rio Grande del Norte, on the Texan frontier, they are mostly impetuous mountain-torrents, or flow through rocky gorges (*barrancas*), sometimes 1000 feet deep. Only in the narrow strips between the plateau and the coast are they available as channels of trade and communication; and in this respect perhaps Arabia alone is less favoured than Mexico.

Climate and Agriculture.—In the plateau region, or *tierras templadas*, the climate is almost that of perpetual spring, and the atmosphere remarkably free from moisture. It is to this peculiar dryness that the city of Mexico, the soil of which has been soaked with the filth of centuries and never properly drained, owes its immunity from pestilence; but, on the other hand, throughout the plateau agriculture is dependent on the use and control of water for irrigation purposes, and an immense desert tract extends between Chihuahua and Zacatecas. Wood in all this upland region is scarce and dear, though there are valuable forests in the extreme north and south. On the coast-lands wood and water are abundant, and the soil fertile, but the climate is such that white men cannot work as labourers there. Yet Mexico contains as fine agricultural land as any in the world, and in most parts two crops a year are grown; while already a score of agricultural colonies, drawn from various nationalities, have been established in the country. Northern Mexico is the original home of the 'cattle-range' business, and there vast herds of horses, cattle, and sheep form the principal wealth of the people. The coast-belt and the terraces up to 3000 feet constitute the *tierras calientes*, where the temperature ranges from 60° to 110° F., and, in the south at least, the magnificent tropical vegetation and the yellow fever and *vómito* reign with equal vigour. Two or three hours by the Vera Cruz Railway carries the traveller from Esperanza, at the very edge of the plateau, down into the heart of the tropics. The cold lands, or *tierras frias*, embrace all the country above about 8000 feet, including the few highest peaks covered with perpetual snow. South of about 28° N. there are only the wet and the dry season, the former from June to October. Farther north there are four seasons; but in the highest zone the rainfall is very scanty, and northern Mexico and the Californian peninsula especially are exposed to seasons of drought. The vegetation of Mexico has the same wide range as the climate. In the lowlands dye-woods and valuable timbers abound in the virgin forests, as well as medicinal plants, india-rubber, palms, &c.; and oranges and bananas, many varieties of cactus, olives, sugar, coffee, cocoa, rice, indigo, cotton, and tobacco, besides the omnipresent maize, all thrive. Many of these products, including the palms, oranges, cacti, olives, tobacco, and of course the maize, grow as readily over a great part of the temperate zone, where the characteristic vegetation embraces pines, evergreen oaks, the maguey or *Agave americana* (q.v.), and the henequen (*Agave sisilana*, see FIBROUS SUBSTANCES). The last two are nearly as frequent also in the *tierras frias*. The vine flourishes in some districts, especially near El Paso, Durango, and Parras in Coahuila,

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where a good wine is made; and mulberry plants have been imported from Europe to develop the silk industry. In Lower California a good deal of Archil (q.v.) is collected, and *chicle* gum is extracted and prepared in the forests along the coast. But agriculture in Mexico is very poorly developed. Primitive methods are followed by the people generally, and the American plough has only in a few localities displaced the crooked stick, sometimes shod with iron, and lashed by raw-hide thongs to the oxens' horns. There is, however, some agricultural machinery in use on the larger *haciendas*, or great landed estates. To their absentee owners such estates, in spite of the expense of irrigation and the shiftless methods in use, are said to return large incomes; but the difficulty and cost of transport are so great that in many parts of Mexico no more corn is grown than suffices to meet the wants of the immediate neighbourhood. Of maize 128,222,000 bushels were raised in 1888. The other principal crops for the same year were wheat, 11,114,000 bushels; beans, 7,547,000 bushels; barley, 5,787,000 bushels. The value of the cotton crop averages £1,645,000, of sugar-cane £1,323,000, of hemp and coffee above a third as much, and of tobacco a fourth. In 1889 henequen was exported from Yucatan to the value of over a million sterling.

Minerals.—Mexico is rich in minerals, many of which have been worked from a very early date. Silver-mining, especially, has been an important industry ever since the conquest, and a considerable number of the mines are still worked at a profit. Gold, though to a greatly less value, is also produced. The coinage records, which date from 1537, and may be taken as substantially accurate, show the production of the precious metals, from that year to 1884, to have been: gold, 114,384,204 dols.; silver, 3,105,979,022 dols.—total, 3,220,363,226 dols. Copper is largely mined in some sections, being found in a pure state in Chiapas and Guanajuato, and elsewhere associated with gold. Other important minerals are iron, including enormous masses of meteoric iron ore, and the mountain a mile from Durango, the Cerro de Mercado, a solid mass of magnetic iron ore; lead, found associated with silver; and sulphur, zinc, quicksilver, platinum, cinnabar, asphalt and petroleum, besides salt, marble, alabaster, gypsum, and rock-salt in great quantities. There are also said to be large deposits of coal, some of excellent quality, in various localities; but as yet little of it has been mined. Throughout Mexico over 100,000 workmen are employed in the various mining enterprises—above 350 in number, and largely supported by American and British capital. Formerly the Mexican ores, especially argentiferous lead, were sent for smelting to the United States; but as the American tariff became prohibitive, establishments were set up on Mexican soil, to which in 1890 some American foundries and works also were transferred.

Manufactures and Trade.—In all Mexico the number of factories using steam power does not greatly exceed one hundred. Very little labour-saving machinery of any kind has been introduced, owing partly to the scarcity of fuel and water, and partly to the difficulty of repairing expensive and complicated machinery, usually—on the haciendas at anyrate—broken on purpose by the peons, who are obstinately opposed to any change. In 1888 there were 98 cotton and 16 woollen factories in Mexico, besides 7 paper-mills and 2 potteries employing steam. Flour and unrefined sugar are also prepared, and a large sugar refinery was erected at Linares in 1890; while there are smaller special manufactures, such as candles, glass, porcelain; and the extraction of henequen fibre, too, is an important industry. Bounties are offered by some states for the establishment of factories within their bounds. But the handicraft production of such articles as pottery, saddles, sandals, many coarser textiles, the national hat, the sombrero, and the national drinks, pulque, mescal, and tequila, all from the various plants of the maguey family, is much more considerable. The great bulk of the Mexican exports is always formed by the precious metals—coin, bullion, and ores; yet the amount of agricultural products and other merchandise has greatly increased since the construction of railways. Of these in 1860 there were none; in 1880 there were 655 miles, in 1890 over 5500 miles open for traffic. The rapid construction of these lines, most of which are in English hands, has saddled the country with heavy responsibilities; the subventions payable to the several companies in the year 1890 amounted to £697,000—about one-seventh of the government's total income—and the sum increases yearly, in accordance with agreements entered into with the companies. Moreover, the spread of the railways has been made an excuse for the almost utter neglect of the roads, which throughout Mexico were bad enough before. The fine highways constructed by the Spaniards were allowed to fall into destruction during the long civil wars, and their present deplorable condition makes them rather a hindrance than a help in the development of the country. A still more serious obstacle to internal commerce is the crushing system of interstate customs—the *alcabalas*—a heritage from the days of Spanish rule; they were abolished by a decree of 1886, but in 1890 the British minister reported that they still existed under various names in the territories and federal district, and in most of the states. Under the excise system, moreover, nearly every possible product, every branch of industry, every social function, even, is taxed; and a swarm of petty officials in every city, town, and hamlet see that nothing escapes its tax, from a bag of seaweed or shavings to a funeral or a fandango. In 1890 the fiscal *gendarmeria* alone cost four-fifths as much as the foreign office and the judicial power together. Still, in spite of these impediments, the trade of Mexico within recent years has steadily increased. During the period 1884–89 the imports advanced from 35,819,000 to 44,500,000 dols., and the exports from 46,553,380 to 60,158,423 dols. (6·60 dollars = £1 sterling). Of the exports in 1889 the precious metals represented 38,785,275 dols.; henequen, coffee, hides, woods, tobacco, and vanilla came next. Nearly two-thirds of the total trade is with the United States, and one-fourth with Great Britain; France follows at some distance, and Germany yet further behind. Home manufactures and the distribution of merchandise are largely in the hands of foreigners. Of late years a large number of French merchants have settled in Mexico, and have nearly everywhere superseded the Germans, who controlled most of the trade from 1850 to 1870. In 1888 there were 12,300 French in the republic, and only 800 Germans, and the former had practically monopolised the dry-goods business of the country, and were pressing their rivals closely in other departments, such as hardware, in which the Germans had secured the lead. Great Britain imports from Mexico mainly mahogany, logwood, and silver ore, and exports thither cottons, woollens, and linens, iron, machinery, and coal; in 1885–89 the value of the former decreased steadily from £724,847 to £465,994, while that of the latter increased from £866,671 to £1,621,106.

Government, Finances, &c.—The Mexican constitution is closely modelled upon that of the United States. The president, who is assisted by six secretaries of state, is elected for four years,

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and can be re-elected for a second term; the senators (two for each state) and representatives (one for every 40,000 inhabitants) receive a salary of 3000 dols. a year; the judicial system occupies the same position as that of the United States; and the several states have elective governors and legislatures. It must be added, however, that neither government nor opposition is conducted on any principle: the government is a personal, and often a tyrannical one; and the opposition also is personal—it rises and falls with its leader, and in the past has found its favourite and safest expression in revolution, which either lifts the pretender into power or leaves him before a firing-party. Either event dissolves the opposition, for no principle has been involved. A strong government, in these circumstances, is most necessary in Mexico, and the cost of the army (27,000 men) swallows up one-third of the annual receipts. As for the navy, it consists of some revenue cutters, a steam-tug, and a training ship (built 1890), and costs £75,000 a year. The receipts of the Mexican federal government advanced in 1885–89 from £4,056,192 to £4,961,512: about five-eighths of this is derived from customs. Within the same period the expenditure ranged from £4,798,914 to £5,876,351. Both in the republic and abroad, however, it is recognised that the government is straining every nerve to meet its obligations, and the general confidence has increased of late years; while the individual states, as a whole, succeed in keeping their expenditure within their income. The interest on the national debt has been punctually paid since 1886, in which year an arrangement was come to between the Mexican government and the English bondholders, under which the various debts were converted and redeemed (in 1889) at 40 per cent. The entire foreign debt of Mexico was in 1890 returned at £10,500,000. In the same year banking facilities were greatly extended, charters being granted for banks of issue and others in various towns; whereas previously banking had been confined almost entirely to two large banks at the capital, and their branches. In 1890 there were 32,437 miles of telegraphs and 4349 of telephones in operation in the republic.

Social Aspects.—Nearly half of the population of Mexico are *mestizos*, who are the farmers and rancheros, the muleteers and servants. Many of them are intelligent and skilful, but the lower orders among them—the so-called *leperos*—are hopelessly idle and vicious. The Indians, who constitute over one-third of the population, lead a life of their own, mingling but not mixing with the other races. From them chiefly are drawn the peons, or agricultural labourers, who, through a system that keeps them permanently in debt, to-day are scarcely less slaves than were their ancestors under the Spaniards. On every hacienda there is a *tienda*, or store; there everything must be purchased by the employés, whose wages (9d. to 1s. a-day) are sometimes paid in 'tallies' on it. The Indian is a poor workman and unreliable, though as a rule tractable if well treated, and easy to manage; his wants are few, and his small surplus earnings usually find their way in a few hours into the pockets of the priest, the pulque sellers, or the proprietors of the bull-ring, cock-pit, or *monte* table. He has no idea of honesty, however; he does not steal on a large scale, but tools, saddlery, and crops must be constantly watched. The Indians who are not employed on the estates usually live in communities resembling the old village communities of Europe. Little has been done to ameliorate the degraded condition of the labouring classes. The staple food everywhere is maize, either in the form of a moist paste or as thin cakes (*tortillas*), with black beans (*frijoles*) and red and green peppers. The houses in Mexico are mostly of *adobe* (sun-dried bricks), one story high. Education, as might be expected, is in a very backward condition: only 9 per cent. of the population can read and write. However, efforts are being made to remove this reproach. There are national free schools in every considerable town, a school of agriculture near the capital, and an efficient military school at Chapultepec, besides the institutions mentioned under Mexico city. Even the priests have opened a number of schools, generally as rivals to the national schools. The great mass of the people are Roman Catholics, but there is no established church. In 1867 the church property was confiscated; convents and religious houses were suppressed, and now no longer openly exist; nor are religious processions permitted. Civil marriage alone is valid, though the church ceremony in addition is not prohibited. Besides the Protestant missionary churches, some of which have made considerable progress, there is a Mexican branch of the Church Catholic of Jesus Christ, which was founded here in 1861, and within twenty years had fifty congregations established, and many schools, orphanages, and seminaries. Among some of the Indians pagan emblems and ceremonies still survive; and in 1889 Lieutenant Schwatka found in Chihuahua cliff- and cave-dwellers who were sun-worshippers.

History of Mexico.—The history of ancient Mexico exhibits two distinct and widely differing periods—that of the Toltecs and that of the Aztecs. Both were Nahua nations, speaking a language which survives in Mexico to this day. The 8th century is the traditional date when the Toltecs are related to have come from the north, from some undefined locality, bringing to Anahuac its oldest and its highest native civilisation. Their capital they established at Tula, north of the Mexican valley. Their laws and usages stamp them as a people of mild and peaceful instincts, industrious, active, and enterprising. They cultivated the land, introduced maize and cotton, made roads, erected monuments of colossal dimensions, and built temples and cities, whose ruins in various parts of New Spain still attest their skill in architecture, and sufficiently explain why the name Toltec should have passed into a synonym for architect. They knew how to fuse metals, cut and polish the hardest stones, manufacture earthenware, and weave various fabrics; and to their invention are assigned the Mexican Hieroglyphics (q.v.) and calendar. It is related that a severe famine and pestilence all but destroyed the Toltec people in the 11th century, and drove the survivors southward to Guatemala and Yucatan, carrying their arts of civilisation with them; and near the end of the next century, after their place had been taken by the rude Chichimecs, a fresh migration brought, among other kindred nations, the Aztecs into the land. Within two centuries and a half this last people had become predominant. But their rule was, in a great degree, a reversion to savagery. They were a ferocious race, with a religion gloomy and cruel, and they grafted upon the institutions of their predecessors many fierce and sanguinary practices. Thus they produced an anomalous form of civilisation, which astonished the Spaniards by its mingled character of mildness and ferocity. After wandering from place to place, the Aztecs founded about 1325 the city of Tenochtitlan, or Mexico; a hundred years later they had extended their sway beyond their plateau-valley, and on the arrival of the Spaniards their empire was found to stretch from ocean to ocean.

Their government was an elective empire, the deceased prince being usually succeeded by a brother or nephew, who must be a tried warrior;

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but sometimes the successor was chosen from among the powerful nobles. The monarch wielded despotic power, save in the case of his great feudal vassals; these exercised a very similar authority over the peasant class, below whom, again, were the slaves. Taxation appears to have been heavy in Mexico even then. The laws were severe, nearly every crime being met with capital punishment in some form; but justice was administered in open courts, the proceedings of which were perpetuated by means of picture-written records. The Mexicans apparently believed in one supreme invisible creator of all things, the ruler of the universe; but the popular faith was polytheistic, with a number of chief and many more inferior divinities, each of whom had his sacred day and festival; whilst a crowd of nature-spirits peopled the hills and woods. At the head of the Aztec pantheon was the frightful Huitzilopochtli, the Mexican Mars. His temples were the most splendid and imposing; in every city of the empire his altars were drenched with the blood of human sacrifice, to supply victims for which the emperors made war on their neighbours or on any revolted territory, and levied a certain number of men, women, and children by way of indemnity. The victims were borne in triumphal processions, and to the sound of music, to the summit of the great pyramidal temples, where the priests, in sight of assembled crowds, bound them to the sacrificial stone, and, slashing open the breast, tore from it the bleeding heart and held it up before the image of the god, while the captor carried the carcass off to feast on it with his friends. In the years immediately preceding the Spanish conquest not less than 20,000 victims were annually immolated, including infants, for the propitiation of the rain-gods. These atrocities, originally referable to the entire absence of live-stock, were incongruously blended with milder forms of worship, in which fruits, flowers, and perfumes were offered up amid joyous outbursts of song and dance. According to the tradition, Quetzalcoatl, who delighted in these purer sacrifices, had once reigned among the Toltecs in the golden age of the world, but, being obliged to retire from earth, he departed by way of the Mexican Gulf, promising to return. This tradition accelerated the success of the Spaniards, whose light skins and long dark hair and beards were regarded as evidences of their affinity with the long-looked-for divinity. The Mexican priesthood formed a rich and powerful order of the state, and were so numerous that Cortes found as many as 5000 attached to the great temple of Mexico. The education of the young of both sexes was entrusted to the priests and priestesses; and the sacerdotal class were thus able to exercise a widely-diffused influence, which, under the later rulers, was almost equal to that of the emperor himself. The women shared in all the occupations of the men, and were taught, like them, the arts of reading, writing, ciphering, singing in chorus, dancing, &c., and even initiated in the secrets of astronomy and astrology.

Cortes landed at Vera Cruz in 1519; the history of the conquest of the Aztec land is told at length in the article on that greatest of the *conquistadores*, who gave to Spain what for centuries remained her richest province. Before his energy, and the superior civilisation of his followers, the power of the native empire crumbled away. In 1540 Mexico was united with other American territories—at one time all the country from Panama to Vancouver's Island—under the name of New Spain, and governed by viceroys (57 in all) appointed by the mother-country. The intolerant spirit of the Catholic clergy led to the suppression of almost every trace of the ancient Aztec nationality and civilisation, while the commercial system enforced crippled the resources of the colony; for all foreign trade with any country other than Spain was prohibited on pain of death. The natives were distributed as slaves on the various plantations, though they were also christianised and looked after by the Inquisition, whose last *auto-da-fé* was held in Mexico city as late as 1815. Mexico was regarded as simply a mine to be worked by the labour of its people for the benefit of Spain. Yet, notwithstanding these drawbacks, it ranked first among all the Spanish colonies in regard to population, material riches, and natural products. For nearly three centuries it may be said to have lain in sullen submission beneath its cruel conquerors' heel, till in 1810 the discontent, which had been gaining ground against the viceregal power during the war of the mother-country with Napoleon, broke into open rebellion under the leadership of a country priest named Hidalgo. After his defeat and execution in 1811 Morelos, another priest, continued the struggle till he shared the same fate in 1815; and a guerilla warfare was kept up until, in 1821, the capital was surrendered by O'Donoju (a Spaniard of Irish descent), the last of the viceroys. In the following year General Iturbide, who in 1821 had issued the *plan de Iguala*, providing for the independence of Mexico under a prince of the reigning house, had himself proclaimed emperor; but the guerilla leader Guerrero, his former ally, and General Santa-Anna raised the republican standard, and in 1823 he was banished to Italy with a pension. Returning the following year he was taken and shot, and the federal republic of Mexico was finally established.

For more than half a century after this (till 1876) the history of Mexico is a record of nearly chronic disorder and civil war. Within that period the country had fifty-two presidents or dictators, another emperor, and a regency; and in nearly every case the change of administration was brought about with violence, a respectable proportion of these great men being ultimately shot by some opposing faction. In 1836 Texas secured its independence, for which it had struggled for several years, and which Mexico was compelled to recognise in 1845. In that year Texas was incorporated with the United States; but its western boundary was not settled, and the Americans coveted a particular strip of territory, and sent troops to seize it. The war thus wantonly provoked was continued with great energy by both parties until 1848, when peace was finally concluded after several bloody engagements had been fought, and the city of Mexico had been stormed and taken by the Americans under General Scott. As the result of this war Mexico was compelled to cede half a million square miles of territory to her powerful enemy. For the details of the war, see UNITED STATES, and SANTA-ANNA. Under the latter also falls to be told so much as is necessary of the history of the next few years. After his fall in 1855, down to 1867, great confusion prevailed. In 1858 Benito Juarez (q.v.) became president, but his claims were contested by General Miramon—the head of the reactionary or clerical party—and the country was plunged in civil war. The acts of wanton aggression and flagrant injustice perpetrated on foreigners in Mexico during this period of internal disorder, in which the cortes passed an act suspending all payments to foreigners for two years, could not fail to draw upon the Mexican government the serious remonstrance of those European powers whose subjects had just cause of complaint; and the result was to bring a fleet of English, French, and Spanish ships into the Mexican Gulf for the purpose of enforcing satisfaction. In 1861 the Spaniards disembarked a force at Vera Cruz; and this step was soon

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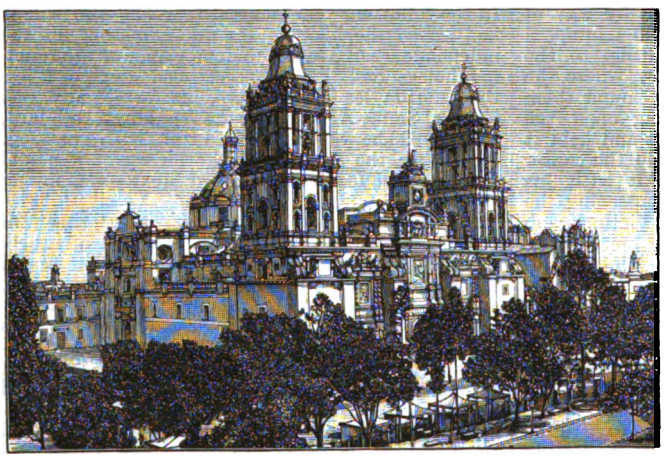
followed by the arrival before that city of the allied fleet. Preparations to advance at once upon the capital alarmed the provisional government, and brought about an armistice, with a view of negotiating a treaty for the future regulation of commercial intercourse between Mexico and the great European powers. This treaty was drawn up and provisionally ratified by the different commanders, but not confirmed on the part of France, and consequently the French troops retained occupation of the Mexican territory after the English and Spaniards had declined to join in further hostile demonstrations. In April 1862 the French emperor formally declared war against the government of Juarez; but the French never met with the welcome they expected from the people, and had ultimately to withdraw, without permanent success, in 1867—mainly because of the jealousy of their action shown by the United States. Maximilian, Archduke of Austria, who had become emperor of Mexico under French auspices, was executed in the same year, and Juarez returned to practically absolute power. For this period, see



Cathedral, City of Mexico.

JUAREZ and MAXIMILIAN. On the death of Juarez in 1872, the chief-justice, Lerdo de Tejada, assumed the presidency, in which, after a revolution, he was succeeded in 1876 by Porfirio Diaz, one of the ablest of Mexican rulers. He was re-elected in 1884, and again in 1888; and under him the position of the republic, with regard both to security and to development of its resources, has steadily improved.

See David A. Wells's *Study of Mexico* (New York, 1887); also Madame Calderon de la Barca, *Life in Mexico* (1843); Brocklehurst, *Mexico To-day* (1882); Castro, *Mexico in 1882* (New York, 1882); F. A. Ober, *Travels in Mexico* (Boston, 1884) and *Mexican Resources* (1885); Von Hesse-Wartegg, *Mexiko, Land u. Leute* (Vienna, 1890); Mrs F. C. Gooch, *Face to Face with the Mexicans* (1890); and Sir Francis Denys' Report on the Finances and Land System of Mexico (1890). An excellent history is H. S. Bancroft's *Popular History of the Mexican People* (1888); see also, besides the articles CORTES and LAS CASAS, Orteja's *Apostólicos Afanes de la Compañía de Jesus en la América Septentrional* (Barcelona, 1754; new ed.—*Historia de Nayarit*, &c.—Mexico, 1887); Mora, *Mexico y sus Revoluciones* (8 vols. Paris, 1834), and *Documentos para la Historia de Mexico* (20 vols. Mexico, 1853–57); Lerdo de Tejada, *Comercio exterior de Mexico desde la Conquista hasta hoy* (Mexico, 1853); Frost, *History of Mexico* (New Orleans, 1882); Ballou's *Aztec Land* (Boston, 1890); and Miss Susan Hale's volume in the 'Story of the Nations' series (1891). For the Antiquities, see Prescott's *Conquest of Mexico*; Lord Kingsborough's *Antiquities of Mexico* (for picture-writings and documents); Humboldt's *Vues des Cordillères*; Charnay's *Ancient Cities of the New World* (Eng. trans. 1887); Stephens' *Incidents of Travel* (New York, 1841); E. B. Tylor's *Anahuac* (1861), and his admirable summary in the *Ency. Brit.* (9th ed.); Bancroft's *Native Races of the Pacific States* (1875–76); Lewis H. Morgan's *Ancient Society* (New York, 1877); Strebel's *Alt-Mexiko* (Hamburg, pts. i.–ii. 1885–89); and Dr Antonio Peñafiel's *Monuments of Mexican Art* (1890). See also Pimentel's *Historia critica de la Literatura y de las Ciencias en Mexico* (Mexico, 1886 *seqq.*).

Mexico (CITY), the capital of the republic, is situated 7347 feet above the sea, at the lowest level of the great lacustrine basin (1400 sq. m.) of the Anahuac plateau. Lake Tezcuco, the largest of the six lakes that occupy this hill-girt valley, and amid whose waters, Venice-like, the city first rose, has now retired 2½ miles to the north-west—partly filled up by drainage deposits. In the Aztec city the principal thoroughfares radiated from an immense central square, in which towered the great temple of Huitzilopochtli; and this arrangement is yet preserved in the modern capital. All the main streets converge on the Plaza Mayor, where the site of the old *teocalli* is occupied by the no less famous cathedral (1573–1657). The walls of this imposing building, forming a cross 426 by 203 feet, alone cost nearly £400,000, and the interior, with its twenty chapels and elaborate ornamentation, much more. Built into the foot of one of the two open towers (218 feet) is the famous 'Aztec' (Toltec) calendar stone. Facing the cathedral is the Municipal Palace, and on the sides of the *plaza* are the National Palace (the old vice-regal residence), the national Monte de Piedad, the post-office, and the national museum. Other noteworthy buildings are the national picture-gallery and library, the school of mines, the mint, the Iturbide hotel, and the former palace of the Inquisition, now a medical college; and, mostly in secularised ecclesiastical edifices, there are also schools of law and engineering, a conservatory of music, and an academy of fine arts. There are still left fourteen parish and a number of other churches, including the cathedral of the American Episcopal mission. The principal streets are broad, clean, and well paved and lighted, with houses of stone gaily painted in bright colours. Among the monuments of the city are the noble Columbus monument (1877), the statue of Cuauhtemotzin, the last of the Aztec emperors, and that of the engineer Martinez (1883). In addition to the *alameda*, with its stately beeches, Mexico is remarkable for the extent and beauty of its *paseos*, or raised paved roads, planted with double rows of trees, which diverge far into the country from every quarter; and there are still on Lakes Chalco and Xochimilco, where a line of steamers runs, a few of the floating gardens for which the ancient city was so celebrated. Attempts have long been made to drain the valley of Mexico. A tunnel through the lowest hills to the Tula River (5 miles), cut in 1607–8 by Martinez, proved insufficient, and the city was flooded from 1629 to 1634; and even an open cut through the mountains (1637–67), now 10 miles long and with a greatest breadth of 361 and a greatest depth of 197 feet, has never entirely fulfilled its purpose. Consequently, in the city, with a temperature that never ranges beyond 70° and 50° F., from one-

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eighth to one-fifth of the deaths are due to consumption and pneumonia, and one-third to typhoid and other fevers. It is only the extreme dryness of the atmosphere that renders the site habitable at all. New works, on a very large scale, intended to drain the valley, were begun in 1890 by two English companies. The trade of Mexico is chiefly a transit trade, although it has a few manufactures, as cigars, gold and silver work, paper, pottery, religious pictures, hats, saddlery, &c. It is unlikely, however, that it will long remain in this condition. Foreign enterprise is already working great changes, and there are now railways to Vera Cruz (263 miles), to El Paso (1224), Laredo (840), and Ciudad Porfirio Diaz (1089)—the last three on the Texan frontier—as well as other points. Pop. 350,000.

Mexico, GULF OF, a basin of the Atlantic Ocean, is closed in by the United States on the north, by Mexico on the west and south, and its outlet on the east is narrowed by the jutting peninsulas of Yucatan and Florida, which approach within 500 miles of each other. Right in the middle of this entrance is planted the island of Cuba, dividing the strait into two—the Strait of Florida and that of Yucatan, the former connecting the gulf with the Atlantic Ocean, the latter with the Caribbean Sea. Dr John Murray calculates the area of the gulf at 716,200 sq. m. Over a fourth of this area the ocean-floor lies at a depth of between 1000 and 2000 fathoms, while 58,000 sq. m. is deeper still. The shores, however, are very shallow—as it were, the broad rim of this central cauldron; the portion less than 100 fathoms deep exceeds 400,000 sq. m. The extreme length from SW. to NE. is more than 1100 miles. Of the numerous bays, the largest is the Bay of Campeachy (Campeche). The coasts are mostly low and sandy or marshy, and are lined with numerous lagoons; the best of the few good harbours are those of New Orleans, Pensacola, and Hávana. The gulf is visited from September to March by violent north-easterly gales called *nortes*. There are very few islands. The principal rivers it receives are the Mississippi and the Rio Grande del Norte. See GULF STREAM.

Meyer, CONRAD FERDINAND, Swiss poet and novelist, was born on 12th October 1825, at Zurich, near which he finally settled in 1877. His style is graceful, and he excels in character-drawing and in genre-pictures of descriptive work. His chief novels are *Jörg Jenatsch* (1876; 7th ed. 1889), a story of Switzerland in the 17th century, and *Der Heilige* (1880; 9th ed. 1889), two of the best historical novels of modern German literature. His power is also well shown in *Das Amulet* (3d ed. 1882), *Der Schuss von der Kanzlei* (3d ed. 1882), *Die Leiden eines Knaben* (3d ed. 1889), *Die Hochzeit des Mönchs* (4th ed. 1889), *Die Richterin* (1885), and *Die Versuchung des Pescara* (1887). His poetical skill is best displayed in the idyllic epic poem *Huttens letzte Tage* (1872; 7th ed. 1889), in *Gedichte* (1882; 3d ed. 1887), and in *Engelberg* (2d ed. 1886). There is a Memoir of him by Reitler (1885).

Meyer, HEINRICH AUGUST WILHELM, commentator, was born at Gotha, 10th January 1800, studied at Jena, was pastor at Harste, Hoye, and Neustadt, retired in 1848, and settled in Hanover, where he died 21st June 1873. His name survives in his Commentaries on the New Testament—a monument of exegetical science (commenced 1832). Later editions showed constant improvements, and since his death this work has been continued by Weiss, Wendt, Beyschlag, and others. The English translation in Clark's series is in 20 vols. (1873–82).

Meyer, JOSEPH, publisher and industrial organiser, was born at Gotha, 9th May 1796, and died on 27th June 1856. A man of great energy and liberal ideas, he started several industrial enterprises, the most important being the issue of great serial works by subscription at low prices, such as the German classics, the *Konversationslexikon* (see ENCYCLOPÆDIA), *People's Library of Natural Philosophy, Historical Library*, &c. His publishing business, the 'Bibliographical Institute,' was founded at Gotha, but in 1828 was transferred to Hildburghausen, in 1874 (by his son) to Leipzig.

Meyerbeer, GIACOMO, operatic composer, was born at Berlin, September 5, 1791. The son of Herz Beer, a wealthy Jewish banker, his name was originally Jakob Beer; the name Meyer was afterwards adopted from a benefactor, and the whole consolidated and Italianised. His musical genius was first shown on the pianoforte; at the age of seven he played in public Mozart's D minor concerto. He was received, when fifteen, into the house of the celebrated musician, the Abbé Vogler, at Darmstadt; with his fellow-pupil Weber he was on terms of the most intimate and lasting friendship. His earlier works, produced at Munich and Vienna, were unsuccessful, but in the latter city he obtained fame as a pianist, which might have stood against that of any rival had he chosen to rely on this talent. His ambition, however, was to succeed as a composer; and on the advice of Salieri he proceeded to study vocal composition in Italy. There Rossini's music had just taken the public by storm; and Meyerbeer, with his remarkable adaptability, after three years was able to produce operas in the new style, which at once gained a cordial reception; the last of these, *Il Crociato*, brought out at Venice in 1824, was received with acclamation, and the composer was presented on the stage with a laurel crown. From 1824 to 1831 he lived mostly in Berlin, married, and had two children, whose loss in infancy he keenly felt. He also applied himself, with the unremitting industry he evinced from boyhood, to a minute and comprehensive study of French opera. The result of this was seen in the production at Paris in 1831 of *Robert le Diable* (libretto by Scribe), in which a totally new style was evident. It had unparalleled success over all Europe, and made the fortune of the Paris opera—even Rossini was thrown rather into the shade. It was followed in 1836 by the *Huguenots*, which, with the assistance of a magnificent cast, almost eclipsed its predecessor. He was soon after appointed by the king of Prussia as his Kapellmeister at Berlin. Here he wrote the opera *Ein Feldlager in Schlesien*, the success of which was signalised by the first appearance of Jenny Lind. After long preparation, *Le Prophète* appeared at Paris in 1849, also with success, though it was not altogether to the mind of even friendly critics. The composer now ventured into a fresh field, the Opéra Comique; *L'Étoile du Nord*, given in 1854, carried the day in spite of the prognostications of French critics, and was succeeded in 1859 by *Le Pardon de Ploermel*, known in England as *Dinorah*. He was subsequently occupied with a musical drama, *La Jeunesse de Goethe*, the setting of which M. Blaze de Bury, the author of the work, says he saw complete, but which has not hitherto come to light. In 1861 he set to work with his usual anxiety and fastidiousness on the production of *L'Africaine*, which had been in hand since 1838. But his delicate health gave way before his ceaseless labours, and he died at Paris, May 2, 1864. The opera had a triumphant reception a year later.

Scarcely any composer has been so variously estimated as Meyerbeer. The magnificent praise of Fétis and Blaze de Bury is counterbalanced by the emphatic condemnation of Schumann and the savage and ungrateful attacks of Wagner. There seems to be truth in the main charge of the latter,

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that Meyerbeer, inspired by no deeply rooted artistic principle, made everything subsidiary to theatrical effect. His successive adoption of widely-different styles bears this out; and Heine, an enthusiastic admirer, mentioning his admitted mastery of instrumentation, slily extends it to his never-resting efforts to make everything and everybody concerned in his operas instrumental towards his success. But even opponents concede the power and beauty of such a piece as the famous duet in the fourth act of the *Huguenots*. Endowed with a considerable native talent, he had by unceasing labour mastered the effects of all the different schools, and was able to utilise his knowledge to brilliant purpose. Written *ad captandum*, his grand operas, unique rather than original, have accurately hit the taste of the public, and to this day these splendid melodramatic spectacular works are the *pièces de resistance* of the Paris Opéra. See Bennett's biography in Novello's series; or Fétis, *Biographie Universelle des Musiciens*.

Mezières, the capital of the French department of Ardennes, on a bend of the Meuse, opposite Charleville (q.v.), 155 miles by rail NE. of Paris. Strongly fortified by Vauban, and protected by a citadel, in 1521 it was successfully defended by the Chevalier Bayard, with 2000 men, against 40,000 Spaniards under Charles V.; in 1815 held out for two months against the Allies, who besieged it after the battle of Waterloo; and in the Franco-German war of 1870–71 capitulated after a frightful bombardment. The principal building is the Flamboyant church, restored in 1884, in which Charles IX. was married in 1570. Pop. 6550.

Mezö-Tur, a town of Hungary, 40 miles by rail SE. of Budapest. Pop. 21,213.

Mezquite, the name of two trees or shrubs, of the natural order Leguminosæ, sub-order Mimosæ, bearing pods filled with a nutritious pulp, and found in Mexico, Texas, Arizona, &c. The Common Mezquite (*Prosopis glandulosa*, formerly *Algarobia*) is usually a large shrub (though sometimes 40 feet high), with stems often decumbent, and armed with strong straight spines. In dry seasons it exudes a great quantity of gum (*Gum Mezquite*), similar in quality to gum-arabic. The Curly Mezquite, Screw Bean or Tornillo (*Prosopis pubescens*, also *Strombocarpa*), although only a shrub or small tree, is of great value in the desert regions of the western part of North America, where it occurs along with willow-bushes near springs of water. Its wood is used as fuel, and its pods are much liked by cattle and horses; the Indians, too, use them as an article of food.

Mezzanine. See ENTRESOL.

Mezzofanti, GIUSEPPE, Cardinal, a remarkable linguist, was born at Bologna, 17th September 1774. He was ordained priest in 1797, and appointed to the chair of Arabic at Bologna; soon after he was deprived because of his inability to take the oath to the Cisalpine Republic, but was reinstated later. In 1831 he settled in Rome with the rank of Monsignore, and two years after succeeded Cardinal Mai as Keeper of the Vatican Library. In 1838 he was raised to the dignity of cardinal. He died 15th March 1849, at Rome. Mezzofanti's European reputation was founded, not on his writings, but on the almost miraculous extent of his linguistic acquirements. Towards the end of his life he understood and spoke fifty-eight different tongues. As early, indeed, as 1820 Lord Byron called him 'a walking polyglot, a monster of languages, and a Briareus of parts of speech.' Yet he was not in the strict sense a critical or scientific scholar, or even otherwise a man of great intellectual power. See his Life by Russell (1857).

Mezzo-soprano. See SOPRANO.

Mezzotint. See ENGRAVING.

Mfumbiro, a mountain of Central Africa, 10,000 feet high, situated in 1° 30′ S. lat. and 30° 30′ E. long., and west of Victoria Nyanza, just within the borders of the British East Africa Company's territories.

Mhow (*Mhau*), a British cantonment in Indore state, Central India, 13 miles by rail SW. of Indore city. It is 1919 feet above the sea. Pop. (1881) 27,227, mostly Hindus.

Miako. See KYOTO.

Miall, EDWARD, an apostle of disestablishment, was born in 1809, and served as an Independent minister at Ware, and afterwards at Leicester, down to 1840, when he founded the *Nonconformist* newspaper. In 1844 he helped to establish the British Anti-state Church Association, known later as the Liberation Society, and sat in the House of Commons for Rochdale, 1852–67, and for Bradford, 1869–74. On retiring he was presented with ten thousand guineas. He died at Sevenoaks, 29th April 1881. See the Life by A. Miall (1884).

Miasma. See MALARIA.

Miautsé, an aboriginal hill-tribe of southern China, who have contrived to maintain a practical independence and many curious local usages. They consist of numerous clans, still occupying large portions of Kwang-se, Kwei-chow, Kwang-tung, and Yun-nan. Some of them own Chinese sway; other tribes are absolutely independent. They are smaller than the Chinese, and unlike in features as in character. Physique and language indicate their affinity with the Annamese, Siamese, and various other inhabitants of the Indo-Chinese peninsula.

Mica (Lat. *micare*, 'to glitter'), the name given to an important group of rock-forming minerals, which have all a hardness of about 2, and are characterised by their perfect cleavage in one direction—the laminæ being flexible and elastic. They are essentially aluminous silicates containing potash, or soda, or lithia, and in some species magnesia along with potash. They all crystallise in monoclinic forms which approximate closely to hexagonal and rhombic crystals. *Muscovite* or potash mica is a silicate of alumina and potash, with some of the latter occasionally replaced by soda and small quantities of magnesia, ferrous oxide, and fluorine. It is seldom colourless, but usually yellowish, brownish, or greenish. The lustre is pearly or almost metallic. The thin plates into which it divides are generally transparent, and were formerly much used in setting objects for the microscope, but for this purpose thin glass is now preferred. It is still useful for the mounts of natural history objects which are to be put in spirit, being more easily bored than glass. Plates of muscovite often a yard across are found near Lake Baikal, at Acworth in New Hampshire, and in China. Large plates also occur in Sweden and in Norway, and masses of the mineral are met with in Cornwall. In Siberia, China, Peru, and elsewhere it is used as a substitute for glass in windows. It is sometimes preferred to glass for lanterns, and especially for the fronts of stoves, as not being liable to break with sudden changes of temperature. In India small pictures are frequently painted in distemper on mica. Muscovite occurs as one of the essential constituents of ordinary granite, gneiss, and mica-schist. It is also an ingredient of many other plutonic rocks and crystalline schists, but is not a primary constituent of volcanic rocks: where present in the latter it is as an alteration-product. *Sericite* is a talc-like variety of muscovite, not uncommonly met with as a constituent of certain schistose rocks,

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to which it imparts a silky lustre on the planes of foliation. *Damourite*, somewhat like sericite, is also a variety of muscovite which occurs occasionally in schistose rocks. *Lepidolite* or lithia mica is a silicate of alumina with potash and lithia; white, rose-red, or violet as a rule, but sometimes greenish; does not occur in measurable crystals but in irregular plates and tables, and now and again in scaly, granular, or compact aggregates. In Moravia a massive granular lepidolite is found with a fine reddish-violet colour. Like jasper, lapis-lazuli, &c., lepidolite is made into ornaments; as a rock-forming mineral it is of small account. Another lithia mica containing iron is called *Zinnwaldite*. *Biotite* or magnesia mica embraces several varieties which in addition to potash contain magnesia, the latter being generally replaced in part by ferrous oxide. When ferrous oxide entirely replaces magnesia we have *iron mica*. The most important of the biotites is *Meroxene*, which occurs in fine crystals on Vesuvius and in other volcanic regions. It was from a study of the fine specimens of meroxene occurring in ejected blocks at Vesuvius that mineralogists were able to determine the crystalline form of mica. Formerly the micas were assigned either to the hexagonal or to the orthorhombic system. Meroxene is met with also in such rocks as granite, gneiss, &c., in scaly granules and plates, often associated with muscovite, and sometimes forming scaly aggregates. It is dark green or brown, sometimes yellowish, but generally very dark or even black, hence it is often called *black mica*. In volcanic rocks (basalt, trachyte, &c.) it occurs sparingly in the form of small scales or plates. Altered forms of meroxene are the red *Rubellane*, occurring in many volcanic rocks, and the black *Voigtite*, met with in granitic rocks. *Phlogopite* is a biotite of a reddish-brown, but sometimes yellow or even greenish colour. It contains a larger proportion of silica than meroxene. *Anomite* is another biotite only to be distinguished from meroxene by some optical characters. *Lepidomelane* is a magnesia mica rich in ferrous and ferric oxides; many of the magnesia micas occurring in granite, gneiss, &c. belong to this variety. The biotites are much more readily decomposed than the muscovites, being often altered into chloritic minerals with epidote and calcite. *Paragonite* or soda mica, an aluminous silicate of soda, occurs chiefly in certain crystalline schists, and is known only in the form of small white or colourless scales. It closely resembles muscovite, from which it can only be distinguished chemically.

MICA-SCHIST is, next to gneiss, one of the most abundant of the crystalline schists. It consists of alternate layers of mica and quartz, but is sometimes composed almost entirely of the thin and shining plates or scales of mica, and from this it passes by insensible gradations into phyllite, as this in turn passes into clay-slate. The quartz occurs pure in thin layers like vein-quartz, thinning off and swelling out abruptly. Sometimes it appears as irregular swollen-shaped lumps round which the folia of mica are arranged. The mica is usually muscovite, but occasionally it is biotite. Many accessory minerals are found in mica-schist, especially garnets: others are schorl, kyanite, hornblende, andalusite, beryl, &c. In many places the mica-schist has a finely corrugated or wavy structure.

Micah, or MICAIAH, as the name is given in Jer. xxvi. 18 (*Micayah*—i.e. 'Who is like unto Jah?' Vulg. *Michæas*), the sixth in order of the twelve minor prophets (third in LXX., after Hosea and Amos), is described as 'the Morashtite'—i.e. a native of Moresheth Gath in the lowland of south-western Judah near Eleutheropolis, and as having prophesied during the reigns of Jotham, Ahaz, and Hezekiah, more particularly during that of Hezekiah, and so as a younger contemporary of Isaiah, Hosea, and Amos. He is carefully to be distinguished from the Micah or Micaiah of 1 Kings, xxii. 8 *et seq.*, the son of Imlah, who was a prophet of the northern kingdom, contemporary with Elijah, in the reign of Ahab. The Book of Micah is described in the superscription as the word of the Lord that came to Micah which he saw concerning Samaria and Jerusalem. It consists of a collection of detached prophecies the phraseology of which is in some cases extremely obscure; no chronological order or other method of arrangement is discernible. The opening passage (i. 2–8) contains a threatening of the divine judgment against Samaria on account of her idolatry; but the rest of the book, as might be expected in a Judæan prophet, seems to relate entirely to the southern kingdom, and probably was not spoken or written until after the fall of the kingdom of Israel in 722 B.C. The oracle contained in i. 9–16, relating to Judah and Jerusalem, is best interpreted in connection with the Assyrian invasions, threatened and actual, of the Judæan lowland, shortly after that date; it is rendered obscure for the English reader by a number of plays upon words which can be appreciated only in the original language. Micah was not, like his contemporary Isaiah, a politician, but he lived (though not in the capital) in the same religious and social environment, and took practically the same view of the position of the people of Jehovah. His whole activity was directed to a work of moral reformation; his book consists of unsparing denunciations of mercenary prophets, rapacious and corrupt priests, cruel and oppressive nobles, and a treacherous, fraudulent, godless people. He went beyond Isaiah in his threatenings, for he did not regard even the holy city as inviolable, but, anticipating Jeremiah by a hundred years, foretold the destruction of Jerusalem and the Temple (see iii. 12; iv. 9, 10; some critics regard iv. 11–13, a passage which seems to take the opposite view, as an interpolation). Like Isaiah Micah pointed the hopes of the people of Jehovah forward, in noble language, to the establishment of the kingdom of righteousness and peace based on the knowledge and fear of the Lord; he also looked forward to the kingship of a Messiah of the house of David, who (in this Micah was original) like his great ancestor should come forth from Bethlehem. In the opinion of some critics the 6th and 7th chapters of Micah are to be assigned to an anonymous author, writing in the reign of Manasseh, under circumstances similar to those described in 2 Kings, xxi. Wellhausen and others give a still later date to vii. 7–20, where the situation contemplated is in a marked degree similar to that of Isa. xl. *et seq.* The phrase in vii. 18 ('who is a god like unto thee?') may have suggested the attribution to Micah.

For commentaries on this book, see the works on the minor prophets cited under HOSEA; also the special works by Caspari (1852) and Ryssel (1889), in German; Roorda, in Latin (1869); and Cheyne, in English (1882).

Michael. See ANGEL.

Michael, emperor of Constantinople. See BYZANTINE EMPIRE.

Michaelis, JOHANN DAVID, one of the most learned biblical scholars of the 18th century, was born on 27th February 1717 at Halle, the son of Christian Benedict Michaelis (1680–1764), a theologian and orientalist of some distinction. After completing his studies at his native university, he travelled to England, passing through Holland, where he made the acquaintance of the orientalist Schultens. In 1745 he began to teach at Göttingen, and in the following year was

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appointed professor of Philosophy. He took an active part with Haller in the formation (1751) of the Göttingen Academy. In 1750 he had been elected to fill the chair of Oriental Languages in addition to that of Philosophy. He died on 22d August 1791. Michaelis was a man of vast attainments, especially in history, archæology, and natural science; and to him belongs the credit of being one of the first to study the biblical narratives as an integral part of oriental history.

His chief works are *Einleitung in die göttlichen Schriften des Neuen Bundes* (2 vols. 4th ed. 1788; Eng. trans. by Marsh, 4 vols. 1802); *Mosaisches Recht* (2d ed. 5 vols. 1776–80; Eng. trans. by Dr Alexander Smith, 1814); *Spicilegium Geographiæ Hebræorum* (1769–80); *Orientalische und exegetische Bibliothek* (1775–85); *Supplementa ad Lexica Hebraica* (6 vols. 1784–92); and numerous others. See his autobiographic *Lebensbeschreibung* (ed. by Hassencamp, 1793).

Michaelmas Daisy. See ASTER.

Michaelmas Day. On this festival, which was instituted in the year 487 in honour of St Michael and all Angels, is elected the Lord Mayor of London. In England, too, Michaelmas Day is one of the four quarterly terms on which rents are paid; and among the curious manorial rites connected with this season may be mentioned the Lawless Court kept on King's Hill, near Rochford, in Essex, on the Wednesday morning following Michaelmas Day. The Michaelmas goose is an ancient institution. For Michaelmas term, see TERM.

Michel, FRANCISQUE, a learned French antiquary, was born at Lyons, 18th February 1809, became in 1839 professor in the Faculté des Lettres at Bordeaux, and died 19th May 1887. He earned a great reputation by his exhaustive researches in Norman history, French *chansons*, argot, the Basques, the history of mediæval commerce, and many more among the byways of learning; and among individual books may here be named *Histoire des Races maudites de la France et de l'Espagne* (2 vols. 1847); *Histoire des Hôtelleries, Cabarets, Hôtels garnis*, &c. (2 vols. 1851–54); *Œuvres choisies de Shakespeare* (3 vols. 1868); *Les Écossais en France et Les Français in Écosse* (2 vols. 1862); and *A Critical Inquiry into the Scottish Language, illustrating the Rise and Progress of Civilisation in Scotland* (Edin. 1882).

Michelangelo, often MICHAEL ANGELO. Michelangelo Buonarroti, the most distinguished sculptor of the modern world, was born on March 6, 1475. His father, Ludovico di Leonardo Buonarroti Simoni, was a poor gentleman of Florence, who, though bankrupt in fortune, did not lack the consideration which is paid to ancient lineage. When the sculptor was born, his father was *podesta* or mayor of Caprese and Chiusi, two townships in Tuscany. He returned to Florence when his term of office was expired, and the child was entrusted to the fostering care of a stonemason's wife at Settignano, where Ludovico owned a small property. The boy's enthusiasm for art revealed itself at an early age, and, though he was sent to the school of Messer Francesco di Urbino to learn the elements, his best energies were devoted to drawing. To his father's aristocratic prejudice sculpture seemed a calling unworthy of a gentleman. The lad, however, was resolute, and in 1488, while yet only thirteen years of age, he entered the *bottega* of Domenico Ghirlandajo, to whom he was bound apprentice for three years. None was ever more fortunate than Michelangelo in the time and place of his birth. From his boyhood he was familiar with the masterpieces of Donatello, and he joined his contemporaries in making a pilgrimage to the convent of the Carmine, where he studiously copied the supreme examples of Masaccio's art. By Ghirlandajo he was recommended to Lorenzo de' Medici, and entered the school which the 'Magnifico' had established in his garden on the Piazza. Here was gathered together, under the care of Bertoldo, a priceless collection of antiques, and here Michelangelo encountered what proved the most enduring influence of his life. His talent was not long in arresting the notice of Lorenzo, who henceforth gave him a room in his house and a seat at his table; and to the beneficence of his patron he owed the acquaintance of Poliziano and many of the most learned of the day. To this period belong two interesting reliefs. In the 'Battle of the Centaurs' (now in the Casa Buonarroti at Florence) the classical influence of Lorenzo's garden is strikingly apparent. In truth it has little of the dignified calm which distinguishes the work of Phidias and his contemporaries; the style of a later period was its inspiration; but it reveals the lasting characteristics of Michelangelo's genius. The inexhaustible variety of pose, the straining muscles, the contorted limbs, which mark the artist's mature work, are already visible. A marvellous contrast to the 'Centaurs' is the 'Madonna,' conceived and executed in the spirit of Donatello, which without a suggestion of movement is quiet and harmonious in composition, and though not consciously antique is far more classical.

In 1492, when Michelangelo had spent some three years in his house, Lorenzo died, and the school which had conferred so great benefits upon art was straightway dissolved. Piero, Lorenzo's son and successor, it is true, retained for a time the services of Michelangelo, but he is said to have treated him with scant courtesy; and Michelangelo fled to Bologna. Nor did he here wait long for a patron; Gianfrancesco Aldrovandi commissioned him to execute a statue. In Bologna the sculptor lingered for a year; then he once more (in 1495) returned to Florence. It was during this sojourn in his native city that he fashioned the marble 'Cupid' to which he owed his first introduction to Rome. Baldassare del Milanese persuaded him to give the work the air of an antique by burial, and despatch it to Rome. Here it was purchased by Cardinal San Giorgio, who, though he speedily discovered the fraud which had been put upon him, was quick to detect the talent of the sculptor who had tricked him. He therefore summoned him to Rome, and on June 25, 1496 Michelangelo arrived for the first time in the Eternal City. The influence of Rome and the antique is easily discernible in the 'Bacchus,' now in the National Museum at Florence; it is modelled with an elegance and restraint which are evidence of the hold which the classical tradition, as interpreted by the Græco-Roman sculptors, had upon Michelangelo. To the same period belongs the exquisite 'Cupid' of the South Kensington Museum. The 'Pieta,' which is now in St Peter's, was executed in 1497, but presents an amazing contrast. There is in it a touch of the middle ages, a suggestion of realism which is wholly at variance with the antique ideal. But it is beautifully composed, the drapery is handled with a masterly breadth, and the body of the dead Christ is an epitome of anatomical research.

For four years the sculptor remained in Rome, perpetually urged to return to Florence by his father, who, though he objected to his son's craft as unbefitting his station, was nothing loth to profit by the wealth which was the reward of artistic success. Michelangelo went back; and Soderini, who was then gonfaloniere, permitted him to convert into a statue the colossal block of marble upon which Agostino d'Antonio had been at work many years before, and out of

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the irregular block grew the celebrated 'David.' The sculptor was compelled to modify his composition on account of the shape and size of his material. Indeed, it is characteristic of this titan's impetuous genius that obstacles were ever an incentive. His 'David' is the Gothic treatment of a classic theme. The influence of the antique is obvious, but the personal touch of the sculptor is also apparent (especially in such details as the treatment of the hands). The figure is modelled with strength and simplicity; the surface is not furrowed by an endless series of lines; there is no parade of anatomical knowledge; in pose and composition there is a stately grandeur, a dignified solemnity, which do not for an instant suggest that the artist was hampered by material difficulties. Indeed, so far from being a *tour de force*, it is a complete, well-ordered achievement. In 1504 it was placed upon its pedestal in the Piazza de' Signori, whence it was removed in 1873 to the Academy of Arts. Michelangelo's sojourn in Florence was a period of great activity. A second 'David' (this time of bronze) was commissioned and sent to France, where all trace of it is lost. The sculptor also designed two marble reliefs, one of which passed into the possession of Sir George Beaumont, and is now at Burlington House. The 'Holy Family of the Tribune' and the 'Manchester Madonna' in the National Gallery belong to the same time, and prove that Michelangelo had not wholly neglected the art of painting. His genius, however, was essentially plastic. He had far more interest in form than in colour; indeed, in his hands pictorial art was but an opportunity for the vigorous modelling of the human form. The zeal of Soderini, the gonfaloniere, in the cause of art inspired the scheme of decorating the Great Hall of the Council. For one wall Leonardo da Vinci was commissioned to design a fresco; a second was entrusted to Michelangelo. The latter chose as his subject an incident in the war of Pisa, and executed a cartoon which Vasari with devout exaggeration proclaims to have been of divine rather than of human origin. A body of soldiers were represented bathing; their camp has been attacked by the enemy, and they are hastening to seize their arms and repulse the assault. The motive is admirable, and gave the artist scope for the variety of pose and the violent action in which he took peculiar delight. The fresco was never completed, and on the return of the Medici to Florence the cartoon was removed to the hall of their palace, to which painters were permitted unrestrained access. The result was that over-zealous admirers of Michelangelo cut the cartoon to pieces. The original is lost as irretrievably as the masterpieces of Zeuxis and Apelles; and our impression of it is obtained from literary sources, from the engravings of Marcantonio and Agostino Veneziano, who reproduced single groups, and from a suspicious copy at Holkham Hall.

In 1503 Julius II. succeeded to the pontificate, and, being not merely a warrior but a patron of the arts as well, he lost no time in summoning Michelangelo to Rome. In Michelangelo the sturdy pope met his match. The two men, indeed, were not unlike in temperament. Each was endowed with the extraordinary vigour of mind and body which was the best characteristic of the Renaissance. But both had the defects of their qualities; Michelangelo no less than Julius was violent and overbearing; the sculptor could as little brook opposition as the pope, and their dealings were continually interrupted by bitter quarrels and recriminations. It is impossible to accept Vasari's anecdotes as statements of the literal truth, but there is no doubt that they have solid foundation in fact. Had Michelangelo known the misery and disappointment which were in store for him, he might well have hesitated before obeying the summons of Julius. The pope commissioned the sculptor to design his tomb, and thus began what Condivi aptly calls *la tragedia della sepoltura*. For forty years Michelangelo clung to the hope that he would yet complete the great monument in honour of Pope Julius and his own genius. But intrigue and spite were too strong for him. Other demands were continually made upon his energy, and the sublime statue of Moses is the best fragment that is left to us of the tomb of Julius. However, at the outset both pope and sculptor were full of enthusiasm. The plans were approved and the work would have at once proceeded had not the sculptor one day asked audience of the pope in vain. In a sudden fit of temper Michelangelo left Rome, and the entreaties of the pope availed not to procure his return. After much fruitless negotiation they met at Bologna, and, with the generosity that was characteristic of both, were instantly reconciled. Michelangelo, as a pledge of renewed friendship, commenced a statue of Julius II., which was cast in bronze and placed over the gate of San Petronio (afterwards melted down and converted into a cannon). Michelangelo followed the pope to Rome, eager to resume his work upon the monument. In the meantime, however, Bramante, if Vasari's account be true, had poisoned the pope's mind against the sculptor; instead of being allowed to devote himself to the monument, which he deemed the work of his life, he was ordered to decorate the ceiling of the Sistine Chapel with paintings. In vain he protested that sculpture was his profession, in vain he urged Raphael's higher qualifications for the task; the pope was obdurate, and in 1508 Michelangelo began the work for which his training had ill adapted him. However, he set himself resolutely to the toil, and in four years achieved a masterpiece of decorative design. The flat oblong space of the ceiling is divided into nine compartments, each of which contains an incident drawn from the Old Testament. The lunettes above the windows, the spandrels, as well as the ressaults between the lunettes, are filled with heroic figures. The designs are admirably accommodated to the space they are intended to fill, and the broad effect is one of harmony and homogeneity. It is only when you analyse the composition and examine each compartment by itself that you realise the superhuman invention, the miraculous variety of attitude and gesture, which place this marvellous work among the greatest achievements of human energy. Michelangelo, however, had not forgotten the monument of Pope Julius, and no sooner had he finished his work in the Sistine Chapel than he returned with eagerness to the tomb. But once again his favourite project was interrupted. In 1513 Pope Julius II. died, and, though he had commanded the cardinals Santi Quattro and Aginense to see that his monument was completed in accordance with his expressed wishes, the cardinals were thrifty men, and demanded of Michelangelo another and a more modest design. This was furnished, but before the work could be undertaken Pope Leo X. had despatched Michelangelo on business of his own to Florence. Leo was of the Medici family, and professed no interest in the tomb of his predecessor; his whole anxiety was to do honour to his ancestors by the adornment of Florence. He therefore commissioned Michelangelo to rebuild the façade of the church of San Lorenzo and enrich it with sculptured figures. The master reluctantly complied, and set out for Carrara to quarry marble. Even here the pope would not permit Michelangelo to work his will, but urged him to leave Carrara and seek what material he needed at Serravezza, which lay in Leo's own territory. In vain the sculptor

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insisted that the marble was of inferior quality, and that to convey it to Florence roads must be cut through mountains and laid upon stakes over marshland and swamp. Leo X. was deaf to reason, and for eight years Michelangelo was forced to devote himself to toil as idle as that of Sisyphus; from 1514 to 1522 his artistic record is a blank. Nor were the next years fruitful of achievement. The sculptor remained in Florence still working on the tomb of Julius and building the Sacristy of San Lorenzo. In 1528 the unsettled state of his native city turned him again from the practice of his art. He devoted himself heart and soul to the science of fortification, and when in 1529 Florence was besieged Michelangelo was foremost in its defence. The city was forced to surrender in the following year, and for some time Michelangelo, fearing treachery, lay in concealment. His safety, however, being assured, he resumed his work upon the tombs of the Medici, and completed the monuments to Giuliano and Lorenzo de' Medici, which are among the greatest of his works. In 1533 yet another compact was entered into concerning Pope Julius's ill-fated sepulchre; it was at last determined to reduce it to a mere façade, and Michelangelo would doubtless have carried it to completion had he not been once again commissioned to adorn the Sistine Chapel with frescoes. After a delay of some years he began in 1537 to paint 'The Last Judgment.' The design was finished and displayed on the Christmas-day of 1541, and was the master's last pictorial achievement. In the following year he was appointed architect of St Peter's, and devoted himself to the work with loyalty and devotion until his death, which took place on the 18th February 1564.

Michelangelo is by far the most brilliant representative of the Italian Renaissance. He was not only supreme in the arts of sculpture and painting, but was learned in all the learning of his age, a poet of powerful individuality, an architect and military engineer. From an artistic point of view his was by far the greatest personality, his the most potent influence, the modern world had seen. His debt to the antique was immense, yet it must be remembered that he knew only the decadence of classical art; had he seen the masterpieces which have since been brought to light, it is possible that his style might have been largely modified. But, though in the finest examples of his art classical influence is conspicuous, he was rarely able to exclude his personality. As he was violent in his life, so there is ever a touch of violence in his art. He is making, as it were, an emphatic protest against the dark ages which lay behind him; he is discovering to the world the utmost possibilities of the reawakened arts. There is generally to be observed in his work a profound learning, an extraordinary knowledge of perspective and foreshortening, a firm conviction that there is nothing in heaven or on earth that art cannot express. At beauty Michelangelo does not aim. Grandeur, sublimity, power, these are his themes. And he recurs to them again and again with the persistence which characterises a man of transcendent genius. Both Donatello, who came before him, and Raphael among his contemporaries, were more richly endowed than he with the artistic temperament: Neither the one nor the other was wont to overstep the limits of art. Their ambition was to attain perfection; they did not chafe against the restraints imposed by beauty and simplicity. But Michelangelo, though their inferior in art, had a far greater, if less governable, genius. He was not content to model a perfect statue, to paint a perfect form; he was ever striving to throw himself and his intelligence into marble or on to canvas. And so, though his works will be ranked till the end of time among the masterpieces of the world, he is neither for sculptor nor for painter the most valuable model. As an influence he was more potent than any of his contemporaries, and it can hardly be said that his influence was wholesome. The Flemish and Dutch painters, who visited Italy in the 16th century, carried home with them his love of distorted limbs and twisted draperies, but failed to catch a breath of his invention and vigour. It is easy, even for the mediocre, to parody a strongly-marked talent.

The master's career is not without irony. His genius was plastic; by temperament and training he was a sculptor, and yet frescoes were the only works he was destined to bring to fulfilment. He has left behind him, it is true, not a few grandiose statues, such as the 'Moses,' but none of his elaborate designs for sculptural monuments was ever completed. His career, indeed, was, until he came for the last time to Rome, a prolonged struggle against fate and his patrons. Time after time his own projects were set aside at the pleasure of a pope. For this his own waywardness and excitability were in some measure to blame, and throughout his life he seems to have been unable to attack any enterprise except at fever-heat. His sonnets, the composition of which he, unlike the rest of mankind, reserved for his old age, possess the same qualities as his statues. Just as his 'David' was torn from the marble, so his verses are rough-hewn out of the language. In all of them it is meaning rather than form that is sought after. Dr Johnson's criticism of a production of Bentley's is precisely applicable to them. 'They are the forcible verses of a man of a strong mind, but not accustomed to write verse.' The best of them were inspired by his friendship for the accomplished Vittoria Colonna, the widow of the Marchese di Pescara. Michelangelo's life was untouched by the passion of love, and his one romance belongs to his old age. He is said to have met Vittoria for the first time in 1538, and until her death, which took place in 1547, the closest ties of friendship bound them. Her loss was the severest blow which ever fell upon him. He painted her portrait, and this honour he conferred on none other save Tommaso Cavalieri, for whom he cherished a romantic attachment and to whom also he addressed sonnets.

Michelangelo's character was a strange medley of conflicting qualities. Though kind and loyal to those who depended on his care—as is proved by his untiring interest in his nephew and his devotion to Urbino, his faithful servant—he showed himself resentful and even suspicious to his enemies. He could brook no opposition to his wishes, and he mercilessly attacked those who dared to withstand him. But he lived in an age of treachery and intrigue, and much may on this count be forgiven him. He loved solitude and a simple life. From his earliest youth he was an eager student of literature, and applied himself with peculiar devotion to Dante and Petrarch. Though feared and attacked by the envious among his contemporaries, he earned his full meed of praise during his lifetime, and at his death universal honour was paid to his memory.

See Lives by Vasari and Condivi. The best edition of the letters is Milanesi's *Lettere di Michel Angelo* (1873). The sonnets have been edited by Cesare Guasti, *Rime di Michelangelo Buonarroti* (1863), and translated into English by J. A. Symonds. Of modern and critical biographies there is no lack. The best and most compact is that contained in Anton Springer's *Raffael und Michelangelo* (2d ed. 1883); Hermann Grimm's *Leben Michelangelo's* (5th ed. 1879) includes much that is valuable, but it is diffuse and not a little sentimental.

Michelet, JULES, a great French historian, was born a printer's son at Paris, 21st August 1798. After a brilliant course of study under Villemain

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and Leclerc, he became at twenty-three a professor of History in the Collége Rollin. Later he lectured at the Collége Sainte-Barbe and the École Normale, and after the revolution of 1830 was given an important post at the Archives, became assistant to Guizot at the Sorbonne, and tutor to the Princess Clémentine. In 1838 he was elected to the Academy, and at the same time became professor of History at the Collége de France. Already he had made his name known by admirable handbooks on French and on modern history, and commenced the monumental work which was to give him an illustrious place among great historians, his *Histoire de France* (18 vols. 1833–67; new ed. 19 vols. 1879), the labour of about forty years. Other works were *Origines du Droit Français cherchées dans les Symboles et Formules du Droit Universel* (1837), *Mémoires de Luther* (1845), and *Procès de Templiers* (1841–51). Michelet had a great dislike for priests, but especially for the Jesuits, and he now plunged into controversy with all the impetuosity of his nature and eloquence, bringing to bear upon the enemy at once all his powers of sarcasm and all his unrivalled knowledge of history. Three books were the fruits of his polemic: *Des Jésuits*, written in conjunction with Edgar Quinet (1843); *Le Prêtre, la Femme, et la Famille* (1845); and *Le Peuple* (1846). Next followed his famous *Histoire de la Révolution* (7 vols. 1847–53; centenary ed. 5 vols. 1889), which is not a good history with all its eloquence and enthusiasm. Before its conclusion Michelet had lost his office by refusing to take the oath of allegiance to Louis Napoleon. Henceforth he lived mostly in Brittany and in the Riviera, buried in his gigantic literary labours. A series of books of a novel kind, full of rhapsodic eloquence and more valuable as literature than as science, were *L'Oiseau* (1856), *L'Insecte* (1857), *La Mer* (1861), and *La Montagne* (1868). Other books of unusual interest were *L'Amour* (1858), *La Femme* (1860), *La Sorcière* (1862), and *La Bible de l'Humanité* (1864). The little book, *Nos Fils* (1869), was a plea for compulsory education. Michelet's great history brings down the story of France to the outbreak of the great Revolution. The second instalment continues it to the close of the Revolution. In the last years of his life he set himself to complete his task, and thus bequeath a great continuous history to France, but he did not live to carry it beyond Waterloo (3 vols. 1872–75). He died at Hyères, 9th February 1874.

Michelet ever treats history from a personal point of view, and his imagination is prone to bring into undue relief striking figures and dramatic scenes and incidents. Thus his work is a series of tableaux, as these were visible to the eyes of a man of genius, full of prejudices for and against his puppets, and destitute of the sense for historical perspective. Yet the whole stands out a masterpiece of genius, instinct with life, and the wide range of historical literature must be ransacked for episodes surpassing his treatment of Joan of Arc or the Templars, or the luminous geographical survey of France with which the work opens. See the books by G. Monod (1875), Noël (1878), Corréard (1886), and Jules Simon (1889).

Michigan (Chippewa-Indian *Mitchi Sawgyegan*, 'Great Lake,' originally applied to both Lakes Huron and Michigan), the third in size of the five great fresh-water lakes of North America, and the only one lying wholly in the United States, having Michigan on the N. and E., and Wisconsin on the W. It is about 335 miles long, and from 50 to 88 broad; the mean depth is 325 feet, the maximum 870. It has the same elevation as Lake Huron (with which it is connected by the Strait of Mackinaw)—581$\frac{3}{10}$ feet above the sea-level; this is 20½ feet lower than Lake Superior, and 8$\frac{4}{10}$ feet above Lake Erie. Its surface area is 22,450 sq. m., or 1350 less than that of Lake Huron; but its drainage area—37,700 sq. m.—is 6000 sq. m. greater than its neighbour's. There is a neap-tide of 1½ inch, and a spring-tide of about 3 inches. The shores of Lake Michigan, which are guarded by a number of lighthouses, are for the most part low; the annual erosion amounts to about 5 feet. Its principal harbours are those of Chicago, Milwaukee, and Racine. See Crosman's *Chart of the Great Lakes* (Milwaukee, 1888).

Michigan, one of the northern tier of states of the American Union, the seventeenth in area and ninth in population, is in 41° 42′ to 48° 20′ N. lat., and 82° 25′ to 90° 32′ W. long. It has an area of 58,915 sq. m., or more than that of England and Wales; 1114 sq. m. are occupied by 5173 small lakes, while the surface of 179 islands and islets, from one acre upwards, measures about 633. The coast-line in navigable lake waters is 1624 miles. The state is bounded on the S. by Indiana and Ohio; on the E. by Lake Erie, Detroit River (properly Strait), Lake St Clair, St Clair River, Lake Huron, and St Mary's River, beyond all which lies the province of Ontario, Canada; on the N. by Lake Superior, on the SW. (upper peninsula) by Wisconsin, and on the W. by Lake Michigan. From its north-western point at the mouth of Montreal River to the extreme south-east on Maumee Bay is about 500 miles. It is sometimes called the Peninsular State, from its formation in two great peninsulas, the upper and lower, or northern and southern. The upper has an extreme length of 318 and width of 164 miles, the lower of 277 and 197 miles; the latter includes the Huron Peninsula, or the 'thumb' of the 'mitten,' in eastern Michigan, and the small Leelanaw Peninsula in the north-west. The eastern part of the other, looking toward St Mary's River, is sometimes called St Mary's Peninsula. Keweenaw Peninsula, bearing the great copper-mines, stretches far north into the waters of Lake Superior; and on the south, near Mackinac Island, is the little but picturesque St Ignace Peninsula. The upper region is mostly rugged, broken, rocky, and comparatively barren, though teeming with mineral wealth; but hopeful beginnings of agriculture have been made in the eastern half of it. In the north-west, near Lake Superior, is the highest land in the state, among the hills known as the Porcupine Mountains (1830 feet above the sea). The famous Mineral range passes south of this, from Keweenaw Point southwestward into Wisconsin; but it is merely a gentle swell from both sides, nowhere really mountainous. No part of the lower peninsula is more than 1780 feet above sea-level; and the mean height is only 160 feet above the environing waters of the lakes. The highest part of Detroit is but 73 feet above the river at this point, and the uplift of a few feet in the adjacent river and lake beds would flood a thousand square miles of Michigan soil. This soil is mainly formed by the glacial drift, in alternated clay, sand, and gravel beds, supplying all the chemical constituents of a good soil, and enabling the growth of all crops adapted to this climate. The mean annual temperature of the state is 46·1° F. (summer, 68·5°; winter, 23·8°); the annual rainfall is 35·8 inches. Both peninsulas, with occasional exceptions of swamps or small prairies, were originally covered with dense forests, the products of which have proved exceedingly valuable. The geology of the state is highly interesting; it represents every rock series known, from the oldest strata to the top of the Carboniferous. In the west of the upper peninsula, on the Wisconsin border, are the Laurentian, and on either side and

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eastward the Huronian formations, in which are the great deposits of iron ore. The Mineral range is of eruptive or volcanic rock, with older strata tilted upon its sides. Farther eastward are the long belts of the Lower Silurian, curving from Green Bay through the St Mary's Peninsula. The lower peninsula is compared, geologically, to a nest of wooden dishes. Its centre is a coal-bearing area of about 5000 sq. m., carrying, however, comparatively little coal of economic value in workable place and shape; though 58,099 tons were raised in 1889. In succession beyond, and in mighty sweeps around the central tract, are the upturned edges of other Carboniferous strata, then the Devonian formations, and finally the Lower Helderberg group of the Silurian. In the Michigan salt group are the rich brine wells of the Saginaw valley; in the Marshall or Waverley are the Huron grindstones, quarried on the shore of Lake Huron; and other groups yield valuable mineral products.

The output of salt for 1889 was 5,950,000 barrels, the number of wells 254. In salt and timber Michigan leads the United States, and in iron and copper the world. The great Calumet and Hecla copper-mines, the largest operated, with perhaps one exception, are on the Keweenaw Peninsula. The total copper output of 1889 was 43,613 tons, of a quality nowhere surpassed, and for certain purposes unequalled. In the same year 5,829,828 long tons of iron ore were mined, mainly in Marquette county. Some gold is found in the upper peninsula, and silver and lead in small amounts. Gypsum appears in immense deposits at Grand Rapids, in the lower peninsula, where 19,823 tons of landplaster and 206,380 barrels of stucco were produced in 1889. Building-stones abound in both peninsulas, and in the upper there are also statuary and other marbles, and such ornamental stones as agates, jasper, chalcedony, chlorastolites, and others. Glass sand is found in the extreme southeast of the state; and lime, brick, tiles, and the like are made easily and cheaply in many parts. Of the many mineral springs nineteen have become popular resorts, and the waters of four have a commercial value.

Lumbering is the second great industrial interest of the state. The forests of northern Michigan are mostly pine, much of it, as the cork pine, of superior quality and greatly in demand; and for many years the lumber product has been enormous. In 1888 it was: lumber, 4,197,741,224 feet; shingles, 2,560,930,250. In places, however, this industry is beginning to decline, from the extensive destruction of the forests. Other leading manufactories, in order, are grist-mills, foundries and machine-shops, iron and steel works, and those of agricultural implements and of furniture. But agriculture remains the chief industry, employing about half the population. This is one of the greatest wheat states, its average yield per acre 19½ bushels. The next most important crops are maize, oats, and barley; and in the 'fruit belt,' a narrow strip of about 200 miles in length on the west shore of Lake Michigan, peaches, plums, grapes, and other fruits are grown in great quantity. It is the fourth state in the Union for wool, of which 11,898,047 lb. were marketed in 1888.

The commerce of the state is very great, and is promoted by three ship-canals—one among the shallows at the head of Lake St Clair, another near the head of St Mary's River, at the Sault de Ste Marie, and another on the Keweenaw Peninsula, known as the Portage Lake Canal. For the year ending June 30, 1889, the imports at Detroit amounted to $3,002,557; domestic exports, $5,922,664; foreign exports, $49,223. There are three other ports of entry, at Port Huron, Grand Haven, and Marquette. The railways in the state have about 8000 miles of track, and reach nearly every one of the eighty-four counties. Popular and higher education has been liberally developed, and the illiterates form only 4 per cent. of the population. Besides the state university at Ann Arbor, there are nine denominational colleges, a state normal school at Ypsilanti, a mining-school at Marquette, the agricultural, the school for the blind, and reform school for boys at Lansing; the deaf and dumb institute at Flint, an industrial home for girls at Adrian, and a school for neglected and dependent children at Coldwater. Other principal state charities are four asylums for the insane, an asylum for insane criminals, and the Soldiers' Home at Grand Rapids. There are state prisons at Jackson and Marquette, and houses of correction at Detroit, Marquette, and Ionia.

History.—The Michigan country was probably visited by Jean Nicolet in 1634, at the Sault de Ste Marie, where the first permanent white settlement was made by Father Marquette in 1668 for a Jesuit mission. Detroit was founded in 1701 by a French colony under Cadillac. The country passed to the English in 1760, and to the United States in 1796; it was again occupied by Great Britain in 1812, but was recovered by the Americans the next year. It formed a part of the North-west territory, erected in 1787; became a part of the Indiana territory in 1802, was organised as Michigan territory in 1805, and admitted as a state in 1837. Pop. (1800) 551; (1840) 212,267; (1880) 1,636,937, including 7249 Indians; (1890) 2,089,792. Detroit (205,699) has remained the chief city from the beginning; Grand Rapids (64,147) is second, and Saginaw (46,169) third. Other cities, in order of population, are Bay City, Jackson, Muskegon, Kalamazoo, Port Huron, Lansing (the capital), Battle Creek, West Bay City, Manistee, Ishpeming, Menonimee, Flint, Ann Arbor, Adrian, &c. See J. M. Cooley, *Michigan* (Boston, 1885).

Michigan City, a town of Indiana, on Lake Michigan, 38 miles by water (57 by rail) ESE. of Chicago. It has a good harbour, contains a college, a state prison, and railway-shops, and manufactures cars, refrigerators, furniture, boots, &c. Pop. (1860) 3320; (1890) 10,704.

Mickiewicz, ADAM, the greatest of Polish poets, was born near Novogrodek in Lithuania (Minsk), on 24th December 1798, and educated at Vilna. In 1822, whilst teaching Polish literature at Kovno, he published his first collection of poems, full of the inspirations of Polish national life. Two years later he was banished to the interior of Russia for being concerned in the formation of a students' secret society. In 1825 he paid a visit to the Crimea, whose beauties he celebrated in a series of exquisite sonnets. Before quitting Russia in 1829 he published three epic poems, *Dziady* (1823–27), on the religious commemorations of their ancestors by the Slav races, and *Konrad Wallenrod* (1828; Eng. trans. 1841) and *Grazyna* (1827), the last two drawn from the struggle between the Lithuanians and the Knights of the Teutonic Order, and both glowing with patriotic feeling. From Russia Mickiewicz passed through Germany (where he visited Goethe and awakened the old Olympian's warm admiration) and France to Italy and Rome. In 1834 appeared his masterpiece, the epic poem *Pan Tadeusz* (Master Thaddeus; Eng. trans. 1886)—a most admirable delineation of Lithuanian customs and manners, traditions, ideas, and beliefs, and Lithuanian character, including fine poetical descriptions of the gloomy primeval forests and of the scenery of the country. After teaching for a while at Lausanne, Mickiewicz was appointed professor of the Slavonic Literatures at Paris in 1840; but three

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years later he was deprived of his chair, having given offence to the government of the day by political utterances in his lectures. For some years he lived a hard and unsettled life—in 1848 he was in Italy, helping to organise the Polish legion that fought side by side with the Italian republicans at Rome—until in 1852 Louis Napoleon appointed him a librarian in the Arsenal Library at Paris. He died 28th November 1855 at Constantinople, whither the French government had sent him to organise a Polish legion to fight against Russia. His body was taken to France and buried at Montmorency; but in 1890 his bones were transported to his native country and laid beside those of Kosciusko in the cathedral of Cracow. Mickiewicz is pre-eminently the national poet of the Poles, and next after Pushkin the greatest of all the poets of the Slavs. His collected works were issued at Paris in 11 vols. (1860–61), at Leipzig in 5 vols. (1862–69), and at Lemberg, a popular edition, in 4 vols. (1885 *et seq.*). See Life by his son Ladislas Mickiewicz (1888), Fontille (Mainard) (1862), both in French, and an anonymous one in German (1857); also the Memoirs of Herzen.

Mickle, WILLIAM JULIUS, translator of the *Lusiad*, was born in Langholm manse, Dumfriesshire, in 1734. He was educated at Edinburgh High School, failed in business as a brewer, and next went to London to make a living by writing. In 1765 he published his would-be Spenserian poem, *The Concubine* (in its next edition entitled *Syr Martyn*), and so prepared the way for his version rather than translation of the *Lusiad* of Camoens (1771–75), which he completed during four years' seclusion in a farmhouse. In 1779 he went to Lisbon as secretary to Commodore Johnstone, but his last years were spent in London, where he died in 1788. Of his other works none are now of importance. His ballad of *Cumnor Hall*, which suggested to Scott the romance of *Kenilworth*, is poor stuff, but the delightful song, 'There's nae luck about the house,' is long since safely assured of its immortality. An attempt has been made to ascribe this song to the ill-fated Greenock poetess, Jean Adam (1710–65), but her claim will not bear serious examination. See *Athenæum* for January 27, 1877. The best edition of Mickle's poems is that edited, with a Life, by the Rev. John Sim (1806).

Micmacs, a tribe of Algonquin Indians, the first with whom the English came in contact; they remained hostile to the English and their colonies till 1760. They now number from 3000 to 4000, and are mostly in Nova Scotia, Newfoundland, and New Brunswick. There is an *English-Micmac Dictionary* (Halifax, 1888), compiled by the late Dr S. T. Rand.

Microbe, MICROCOCCUS. See BACTERIA, GERM.

Microcline. See FELSPAR.

Microcosm and **Macrocosm.** The belief of the ancients that the world or cosmos was animated, or had a soul (see ANIMA MUNDI), led to the notion that the parts and members of organic beings must have their counterparts in the members of the cosmos. Thus, in a hymn ascribed to Orpheus, the sun and moon are looked upon as the eyes of the animating godhead, the earth and its mountains as his body, the ether as his intellect, the sky as his wings. The natural philosophers of the 16th century—Paracelsus at their head—took up this notion anew in a somewhat modified shape, and considered the world as a human organism on the large scale, and man as a world, or cosmos, in miniature; hence they called man a *microcosm* (Gr., 'little world') and the universe itself the *macrocosm* ('great world'). With this was associated the belief that the vital movements of the microcosm exactly corresponded to those of the macrocosm, and represented them as it were in copy. From this it was an easy transition to the further assumption, that the movements of the stars exercise an influence on the temperament and fortunes of men (see ASTROLOGY). Heylin gave the title *Microcosmus* to a work on cosmography in 1621, and Lotze entitled his great work definitive of man's position in the universe *Mikrokosmus* (1856–64).

Microcosmic Salt is used in blowpipe analysis, and may be prepared by mixing concentrated solutions of phosphate of soda and chloride of ammonium. It has the composition $NaNH_4HPO_4,4H_2O$.

Microlestes, the name given to the earliest known mammalian form—a marsupial; it is discovered in the Trias of England and of Würtemberg. Only the teeth, which are of small size, have been met with.

Micrometer (Gr. *mikros*, 'little;' *metron*, 'measure') is an instrument used for the measurement of minute distances and angles. Its different forms, depending on different principles, may be divided into two sections, according as they are applied to physics or astronomy. Of the former section are the Vernier (q.v.) and the Micrometer Screw, the latter instrument being merely a screw with a very regular thread, and a large round head, which is carefully graduated, generally to sixtieths, and furnished with an index. It is easily seen that if a complete turn of the screw advance its point $\frac{1}{10}$ of an inch, a turn sufficient to pass the index from one graduation to another will only advance it $\frac{1}{1000}$ of an inch, &c. This is the micrometer used in the construction and graduation of instruments. Of those applied to astronomical purposes the most simple is a short tube, across the opening of which are stretched two parallel threads, which are moved to or from each other by screws. These threads are crossed by a third perpendicularly, and the whole apparatus is placed in the focus of a lens. The distance of two stars is found by adjusting the two parallel threads, one to pass through the centre of each star, taking care that the threads are placed perpendicular to the line joining the stars, and finding how many turns and parts of a turn of the screw are required to bring the wires to coincide. The angle of position of two stars is also obtained by turning round the instrument till the third wire, which is normally horizontal, bisects both stars, and reading off on the circumference the arc passed over. *Fraunhofer's suspended annular micrometer* consists merely of a steel ring surrounded by a flat rim of glass, and the position of the star is deduced from the time when it crosses the ring and its path while within it. The Abbé Rochon substituted for the wire micrometer one made of two prisms of rock-crystal or Iceland spar, capable of double refraction.

Microphone. This instrument, invented in 1878 by Professor Hughes, does for faint sounds what the microscope does for matter too small for sight; the fall of a bit of tissue-paper or the tread of a fly being rendered audible at many miles' distance. One of the most sensitive substances for microphonic action is willow-charcoal, plunged in a state of white heat into mercury. The theory is that in a homogeneous conductor of electricity the compressions and dilatations of the molecules balance each other, and no variation of current ensues; while, with a state of fine grained non-homogeneity of the conductor, variations of pressure in the conductor produce variations in its conducting power, and thus induce variations in the strength of the electric current traversing it; and these variations of current, when the current passes through a second similar conductor, induce corresponding variations in its molecular stresses,

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which may act upon the surrounding air and give rise to sonorous waves; or the variations in the current may be detected by the Telephone (q.v.). One form of microphone consists of a piece of mercury-tempered carbon, an inch long, placed vertically between two carbon-blocks hollowed to receive its ends; wires connect the blocks with the battery and with the receiver by which the sounds are to be heard. 'A piece of willow-charcoal,' says the inventor, 'the size of a pin's head is sufficient to reproduce articulate speech.' Two nails laid parallel, with wire connections, and a third nail laid across them, make a simple form of microphone. A few cells of any form of battery may be used. Many useful applications of the microphone have been made or suggested.

Microscope (Gr. *mikros*, 'small;' and *skopeo*, 'I see') is an instrument for enabling us to examine objects which are so small as to be almost or quite undiscernible by the unaided eye. Its early history is obscure; but, as it is quite evident that the property of magnifying possessed by the lens must have been noticed as soon as it was made, we are quite safe in attributing its existence in its simplest form to a period considerably anterior to the time of Christ. It is generally believed that the first compound microscope was made by Zacharias Jansen, a Dutchman, in the year 1590, and was exhibited to James I. in London by his astronomer, Cornelius Drebbel, in 1619. It was then a very imperfect instrument, colouring and distorting all objects. For many years it was more a toy than a useful instrument, and it was not until the invention of the achromatic lens by Chestermoor Hall (1729) and John Dollond (1752–57), and its application to the microscope by Lister and others, that it reached the advanced position it now occupies among scientific instruments.

An object to be magnified requires simply that it be brought nearer to the eye than when first examined; but as the focal distance of the eye ranges from 6 inches to 14 inches—10 inches being the average focal distance—it follows that a limit to the magnifying power of the eye is attained whenever the object to be examined is brought too near. If, however, we blacken a card, and pierce a hole in it with a fine needle, and then examine a minute object, as, for instance, the wing of an insect held about an inch from the card, we shall see it distinctly, and that, too, magnified about ten times its size. This is explained by the fact that the pin-hole limits the divergence of the pencil of rays from each point of the object, so that the eye can converge it sufficiently on the retina to produce a distinct impression, which is faint; and did not the blackened card exclude all other light it would be lost. If we now remove the blackened card without either moving our eye or the object under examination, it will be found that the insect's wing is almost invisible, the unassisted eye being unable to see clearly an object so near as one inch; thus demonstrating the blackened card with the needle-hole in it to be as decided a magnifying instrument as any set of lenses.

In fig. 1 AB is a double convex lens, in front of which, between it and its focus, K, but near that focus, we have drawn an arrow, EF, to represent the object under inspection. The cones drawn from its extreme points are representative rays of light, diverging from these points and falling on the lens. These rays, if not interrupted in their course by the lens, AB, would be too divergent for the eye to bring them to a focus upon the retina (see Eye). But after traversing the lens, AB, they travel, if the object be sufficiently near the focus, K, in lines which are nearly parallel, or which apparently diverge from points, such as C, D, not nearer to the eye than the least distance of distinct vision, which is, for most individuals, about ten inches. Suppose the lens is as close as may be to the eye, and that the object, EF, is brought up to it to such a distance that the virtual image, CD, is at 10 inches' distance from the eye; and let us further suppose that the focal length of the lens is such (see Lens)

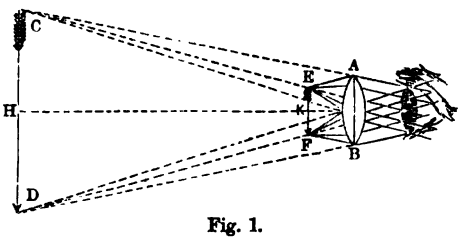

Fig. 1.

that the image, CD, is ten times, linearly, as great as EF; then the eye, instead of vainly striving to see the small object, EF, near K, will seem to perceive distinctly an image ten times as great linearly, and situated at the convenient distance, H. The magnification of the lens is independent of the eye, and is the relation between the size of the image and that of the object. When one of these is at an infinite distance and the other at a principal focus, the magnifying power depends on the position of the eye, and is the ratio between the apparent size of the object at any given distance and that of the virtual image as seen with the aid of the lens; this may be seen to increase as the eye is withdrawn to a greater distance, especially when the one eye is used to look at the object, say a page of print, and the other to look through the lens; but the greatest retinal image is formed when the lens is close to the eye.

We have supposed the whole of the light to enter the eye through the lens, AB (fig. 1); but so large a pencil of light passing through a single lens would be so much distorted by its spherical figure, and by the chromatic dispersion of the glass, as to produce a very indistinct and imperfect image. This is partly rectified by applying a stop to the lens, so as to allow only the central portion of the pencil to pass. But, while such a limited pencil would represent correctly the form and colour of the object, so small a pencil of light is generally unable to illuminate the whole of the magnified picture with any adequate degree of brilliancy, and is therefore incapable of displaying those organic markings on animals or plants which are often of so much importance in distinguishing one class of objects from another. Dr Wollaston was the first to overcome this difficulty, which he achieved by constructing a doublet (fig. 2), which consists of two plano-convex lenses, having their focal lengths in the proportion of 1 to 3, and placed at a distance best ascertained by experiment. Their plane sides are placed towards the object, and the lens of shortest focal length next the object. By this arrangement the distortion caused by the first lens is corrected by the second, and a well-defined and illuminated image is seen. Dr Wollaston's doublet was further improved by Mr Holland, who substituted two lenses for the first in Dr Wollaston's doublet, and retained the stop between them and the third. This combination, though generally called a triplet, is virtually a doublet, inasmuch as the two lenses only accomplish what the anterior lens did, although with less precision, in Dr Wollaston's doublet. In this combination (fig. 3) of

Fig. 2.

Fig. 3.

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lenses the errors are still further reduced by the close approximation of the lenses to the object, which causes the refraction to take place near the axis, and thus we have a still larger pencil of light transmitted, and have also a more distinct and vivid image presented to the eye.

Simple Microscope.—By this term we mean an instrument by means of which we view the object through the lens directly. These instruments may be divided into two classes—those simply used in the hand, and those provided with a stand or frame, so arranged as to be capable of being adjusted by means of a screw to the exact focal distance, and of being moved over different parts of the object. The single lens used may be either a bi-convex or a plano-convex. When a higher power is wanted a doublet, such as we have already described, may be employed, or a Coddington lens, which consists (fig. 4) of a sphere in which a groove is cut and filled up with opaque matter. This is perhaps the most convenient hand lens, as it matters little, from its spherical form, in what position it is held. In the simple microscope single or combined lenses may be employed, varying from a quarter to two inches. There are many different kinds of stands for simple microscopes made, but, as they are principally used for dissection, the most important point next to good glasses is to secure a firm, large stage for supporting the objects under examination. When low powers alone are used the stage-movements may be dispensed with; but when the doublet or triplet is employed some more delicate adjustment than that of the hand is necessary.

Fig. 4.

Compound Microscope.—In the compound microscope in its simplest form the observer does not view the object directly, but an inverted real image or picture of the object is formed by one lens or set of lenses, and that image is looked at through another lens. The compound microscope consists of two lenses, an object and an eye lens; but each of these may be compounded of several lenses playing the part of one, as in the simple microscope. The eye-lens, or ocular, is that placed next the eye, and the object-lens, or objective, that next the object. The objective is generally made of two or three achromatic lenses, while the eye-piece generally consists of two plano-convex lenses, with their flat faces next the eye, and separated at half the sum of their focal lengths, with a diaphragm or stop between them. Lenses of high power are so small as to admit only a very small beam of light, and consequently what is gained in magnifying power is often worthless from deficient illumination. Various devices have been employed to overcome this difficulty. The light may be concentrated by achromatic condensers placed beneath the stage, or the curvature of the lens may be such as to allow as large a number of divergent rays as possible to impinge upon it. Such a lens is said to have a large 'angle of aperture,' the angle of aperture being that made by two lines converging from the margins of the lens to its focal point. Recently lenses, termed 'immersion lenses,' have been constructed, of such a curvature that when immersed in a drop of liquid placed over the object light is admitted on all sides. With an immersion lens there is high magnifying power with sufficient illumination.

The accompanying diagram (fig. 5) explains the manner in which the complete compound microscope acts. We have here represented the triple achromatic objective, consisting of three achromatic lenses combined in one tube, in connection with the eye-piece, which now consists of the field-glass, FF, in addition to the eye-glass, EE. The function of the field-glass, FF, is that the rays of light from the object tend, after traversing the objective, to form an image at AA; but coming in contact with the field-glass, FF, they are bent, and made to converge at BB, where a real image is formed, at which place a stop or diaphragm is placed to intercept all light, except what is required to form a distinct image. From BB the rays proceed to the eye-glass, EE, exactly as they do in the simple microscope. The real image formed at BB is therefore viewed as an original object through the eye-glass, EE. The lens, FF, is not essential to a compound microscope; but as it is quite evident that the rays proceeding to AA would fall exterior to the eye-lens, EE, if it were removed, and only a part of the object would thus be brought under view, it is always made use of in the compound microscope.

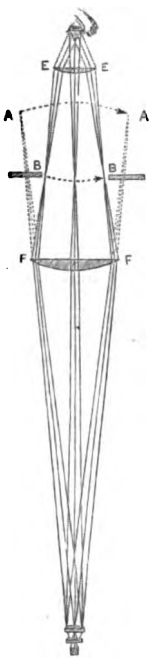

Fig. 5.

A mirror is placed under the stage for reflecting the light through the object under observation. This method of illumination by transmitted light is used when the object is transparent. When opaque, light is reflected on the object by a bull's-eye lens, called a condenser. The best instruments are supplied with six or seven object-glasses, varying in magnifying power from 20 to 2500 diameters. The eye-pieces supplied are three in number, each of which consists of two plano-convex lenses, between which a stop or diaphragm is placed, half-way between the two lenses. As the magnifying power of a compound microscope depends on the product of the magnifying powers of the object-glass and the eye-piece, it follows that its power may be increased or diminished by a change in either or both of these glasses. In the mechanical arrangements it is of importance to have the instrument so constructed that, while every facility is afforded for observation and easy adjustment, there should also be great steadiness. These ends are achieved in various ways, of which fig. 6 is one of the simplest: *a*, brass stand, supported on three feet; *b*, mirror supported on trunnions; *c*, diaphragm, pierced with circular holes of various sizes, to regulate the admission to the object of reflected light from the mirror; *d*, stage-plate, on which the object is placed; *e*, screw, with milled head for fine adjustment; *f*, the object-glass or objective; *g*, brass tube in which the body of the instrument is moved,

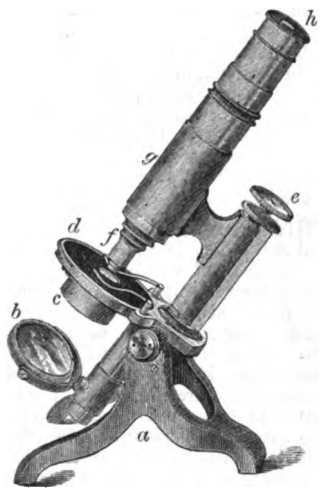

Fig. 6.

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so as to effect the coarse adjustment; *h*, the eye-piece, or ocular.

For a more complete account of the different kinds of microscopes, and the various purposes to which they are applied, see Quekett *On the Microscope* (1885); Carpenter, *The Microscope* (1862; 6th ed. 1880); works on the microscope by Hogg and Beale; *The Microscopist*, by Wythe (3d ed. 1877).

Microtome, an instrument for cutting thin sections of portions of plants and animals preliminary to their microscopic examination. The objects to be cut are imbedded in some material such as paraffin or celloidin, or frozen in gum, which makes the slicing of minute or delicate objects readily feasible. The cutting used to be done by holding the prepared object in one hand and wielding a razor in the other, but this method, apt to yield sections of unequal or insufficient thinness, has given place to the use of some form of microtome, which is at once quicker and more effective. These instruments are quite simple devices by which a sliding razor slices a fixed but adjustable object, or by which the object is made to move up and down across the edge of a razor. As typical forms may be noted the freezing microtomes of Rutherford and others; the sliding microtomes common on the Continent; the ingenious 'Rocker' of the Cambridge Instrument Company—a favourite instrument in British laboratories; and more elaborate and automatic machines manufactured by the same company.

Midas, a common name of the ancient Phrygian kings, most famous of whom is Midas, son of Gordius and Cybele, and pupil of Orpheus. For his kindness to Silenus he was promised by Dionysus whatever he should ask, and in his folly he asked that everything he touched should become gold; but, as the very food he touched was at once changed into gold, he was soon fain to implore the god to take back his fatal gift. He was told to bathe in the sources of the Pactolus, and from that day to this its sands have yielded grains of gold. Once, when Apollo and Pan were engaged in a musical competition on the lyre and the flute, Midas was called in to decide between them. He gave the palm to Pan, whereupon Apollo changed his ears to those of an ass. He concealed the deformity under his Phrygian cap, but could not hide it from his barber, who felt so heavy the burden of a secret he dared not reveal that he dug a hole in the ground and whispered into it, 'King Midas has ass's ears.' He then filled up the hole, and his heart was lightened; but out of the ground sprung up a reed which ever whispered the shameful secret to the breeze.

Middelburg, capital of the Dutch province of Zealand, in the island of Walcheren, and 4½ miles by rail NE. of Flushing. In former times it was one of the leading mercantile cities of the United Provinces, sending many ships to the East and West Indies, and the Levant (Thomas Cromwell was one of its merchants); but its commercial importance has greatly declined, except for an active inland trade in corn, potatoes, and madder. Cotton-factories represent its only industry of note. The town-house, founded by Charles the Bold in 1468, is adorned with twenty-five statues of counts and countesses of Holland and Zealand. A once celebrated abbey (founded in the 12th century) is now used as administrative offices. The museum of the Academy of Sciences contains one of the earliest telescopes made by Lippershey, a native of the town, who, there are good grounds for believing, was the original inventor of the instrument. The new church has marble monuments to the sea-heroes, J. and C. Evertsen, who were killed fighting against the English in 1666. Pop. (1888) 16,455.

Middle Ages is the collective term for the centuries that intervened between the close of classic times and the dawn of the modern epoch. The term does not apply to Asiatic history, except in part, in the Orient. By general acceptance, the middle ages are considered to begin after the overthrow of the Western Empire of Rome in 476, and to terminate at the Reformation, in the first quarter of the 16th century, or even earlier, in the last half of the preceding century, when printing was invented, America discovered, and the Renaissance of Learning was called forth by the Greek refugees from Constantinople.

Middle Level. See BEDFORD LEVEL.

Middlesborough, a great iron-manufacturing and shipping centre in the North Riding of Yorkshire, is a municipal, parliamentary, and county borough, and capital of the district of Cleveland. It is on the south bank of the Tees near its mouth, 15 miles by rail ENE. of Darlington, 50 N. of York, and 246 N. by W. of London. In 1829 the site was occupied by a solitary farmhouse surrounded by marshy land; the town owes its remarkably rapid growth partly to the extension thither (in 1830) of the Stockton and Darlington Railway, but mainly to the discovery of iron ore in the adjoining Cleveland hills (1850). Another industry—that of boring salt—was added in 1886. There are here iron and steel works, blast-furnaces, chemical works, wood and iron shipbuilding-yards, sawmills, marine engineering works, wire, nail, and tube works, salt and soda works, &c. Of the total produce of iron in the United Kingdom in 1889 (8¼ million tons) Cleveland produced 2⅞ million tons. At the shipbuilding-yards over 3000 men are employed, and in 1889 47,092 tons of shipping were launched. The export of coal is extensive. Here are a spacious dock; a graving-dock, finished in 1875 at a cost of £120,000; and the South Gare breakwater (1864–88), nearly 2½ miles long. There are, besides Anglican churches and Nonconformist chapels, a Catholic cathedral and a Jewish synagogue. The town-hall and municipal buildings were erected at a cost of £120,000, and were opened in 1889 by the Prince and Princess of Wales. Among other public buildings are a market-house, corporation baths, banks, workhouse, royal exchange, high school, &c.; and there are theatres, clubs, masonic and temperance halls. The Albert Park of 72 acres was given in 1868 to the borough by Mr H. W. F. Bolckow (1806–78), the first mayor and member of parliament; on the celebration of Middlesborough Jubilee in 1881 a monument to Mr Bolckow's memory was unveiled. There is also a monument in Exchange Place to Mr Vaughan, the founder of the Cleveland iron trade. The first governing body was established in 1841; the borough was incorporated in 1853; and since 1867 Middlesborough returns one member to parliament. The area of the municipal borough is 2813 acres; of the parliamentary borough, 4715 acres. Pop. of the township of Middlesborough (1801) 25; (1821) 40; (1831) 154; (1841) 5463; (1851) 7631; of municipal borough (1861) 18,892; (1871) 39,824; (1881) 55,288; (1890) estimated, 75,000. See H. G. Reid's *Middlesborough and its Jubilee* (1881).

Middlesex, a small county in the south of England, bounded on the N. by Hertfordshire, on the E. by Essex, on the W. by Buckinghamshire, and on the S. by the Thames and the county of London. The northern boundary is irregular, having been determined originally by the estates of the abbey of St Albans and the bishopric of Ely. On the east the river Lea and on the west the Colne and the Brent form the natural boundaries. Although small in extent the population is large, amounting to about 400,000, which is accounted for

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by the neighbourhood of the county and city of London. We first hear of Middlesex as a sub-kingdom dependent on Essex. Its position between the territory of the East Saxons and that of the West Saxons accounts for the name. The greater part of the surface was covered with a forest, of which Enfield Chase and Hampstead Heath are relics; but it was traversed by the great road which crossed the Thames, probably by a ford at Westminster, and led north-westward under the name of the Watling Street. The population was very sparse, and it has been remarked that no castle stood within its boundary, and no great abbey except that of Westminster. After the Conquest we hear little of the county until 1101, when Henry I. granted it in farm to the citizens of London. The position of Middlesex thenceforward until the passing of the Local Government Act in 1888 was wholly peculiar. For a rent of £300 per annum the citizens had the appointment of the sheriff and all other regal rights. It was usual for the sheriffs of the city to hold the office on alternate days, whence the legal form, 'the sheriffs of London and sheriff of Middlesex.' The whole body of citizens held the office, and their nominees were strictly speaking not high but sub-sheriffs, while the Lord Mayor was Lord-lieutenant. Under this régime, as is well known, the county shared in the prosperity of its great neighbour, and became at last so populous that by the act already named those portions of it which lay nearest the Thames and the city were severed from it, and, with certain districts of Kent and Surrey, were incorporated into a new 'county of London' (q.v.). At the same time a sheriff for Middlesex and a lord-lieutenant were appointed by the crown, and a singular usage which had subsisted for more than seven centuries ceased to obtain.

The geological features of Middlesex are of a simple character. It has no high hills, no great rivers, no picturesque valleys; but the low rolling undulations consist of what is known as London clay, topped here and there with river-drift, in which indications of early human life have been detected, as well as the fossil remains of elephants and other now extinct animals. There is but little tillage, except for market-gardens, and a great part of the county consists of grazing land, being occupied largely with villa residences, surrounded in many places with large parks. Brickfields occupy the western border, and the number of large suburban villages—without, however, any important town—is remarkable. Brentford, Uxbridge, and Ealing are to the west of London, and the first-named is usually reckoned the county town. Northward are Harrow, with its school, Enfield, and Tottenham. Eastward are Highgate and Hornsey. London, it may be well to note, was never in Middlesex.

Middlesex, and especially its eastern border, was the scene of many conflicts with the Danes. During the Wars of the Roses, Barnet on the northern verge gave its name to the battle on the neighbouring Hadley Common, where in 1471 the King-maker was defeated and slain. The principal mansions are Hampton Court (q.v.), Sion House (see ISLESWORTH), and Osterley, near Hounslow, which belongs to Lord Jersey, and is a handsome building by Robert Adam.

Middle Temple. See INNS OF COURT.

Middleton, a town of Lancashire, on the Irk, 3 miles W. of Oldham and 6 NNE. of Manchester. Dating mainly from 1791, when it received a charter for a weekly market, it was incorporated as a municipal borough in 1886, the borough area including the townships of Middleton, Tonge, and Alkrington, with parts of Hopwood and Thornham. It is chiefly dependent upon its manufactures of silk and cotton, and has an interesting parish church, a grammar-school (1572), public baths and libraries, &c. Pop. (1851) 5740; (1881) 18,953.

Middleton, a town of Ireland, 13 miles by rail E. of Cork. At the college (1696) Curran was educated. Pop. 3358.

Middleton, CONYERS, a famous controversialist, was born at Richmond in Yorkshire in 1683. He studied at Trinity College, Cambridge, and in 1706 obtained a fellowship, which a prudent marriage soon enabled him to resign. About 1722 he became librarian to the university, and in his later years was presented to the living of Hascombe in Surrey. He died at his seat at Hildesham in Cambridgeshire in 1750. All his life through Middleton was busy in controversy, and in bitterness of tone and ferocity of temper he was a match for any of his contemporaries. His first antagonist was the redoubtable Bentley; but, though at first successful, he was afterwards obliged to apologise to him for libel. His later controversies were theological in character, and in these he gained great distinction, but left his own sincerity under grievous suspicion. His *Letter from Rome, showing an exact Conformity between Popery and Paganism* (1729), was a severe attack on the Catholic ritual, the method employed being the historical—so much more deadly than dogmatic arguments. He next assailed the orthodox champion Waterland, and startled the devout by giving up literal inspiration and the historical truth of the Old Testament stories. He professed to be giving an unassailable answer to Tindal and his school of Deists, but it is none too certain that he was not himself a freethinker, bent on dealing a secret stab to a religion the bread of which he ate. In 1747 and the following year he published his famous *Introductory Discourse* and the *Free Inquiry* into the miraculous powers claimed to have subsisted in the Christian church after the apostolic age. He attacked the ecclesiastical miracles, pointing out that their true source was in the general intellectual condition of the age that produced them, without needing to postulate either supernatural interference on the one hand or human imposture on the other. It is not a little interesting that Gibbon ascribes his boyish conversion to the Roman Catholic faith to the indirect influence of this work, which convinced him not that that church had preserved the gift of miraculous powers during the first four or five centuries, but that most of its distinctive doctrines were already formulated within that period. Middleton's best-known book remains his well-written and eulogistic *Life of Cicero* (1741). See Leslie Stephen's *English Thought in the Eighteenth Century*, chap. iv. part 6.

Middleton, THOMAS, dramatist, born about 1570, was the only son of William Middleton, gentleman, who settled in London and married Anne, daughter of William Snow. The earliest mention of Middleton in Henslowe's *Diary* is under date 22d May 1602, when he was engaged with Munday, Drayton, Webster, and others on a lost play, *Cæsar's Fall*. First on the list of his printed plays is *Blurt, Master Constable* (1602), a light, fanciful comedy. Two interesting tracts, *Father Hubbard's Tale* and *The Black Book*, exposing the practices of London rogues and sharpers, were published in 1604, to which year belongs the first part of *The Honest Whore* (mainly written by Dekker, but containing occasional scenes by Middleton). *The Phœnix* and *Michaelmas Term* (both published in 1607) are lively comedies; and even more diverting is *A Trick to catch the Old One* (1608). *The Family of Love* (1608) and *Your Five Gallants*,

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n.d. [1608], are of slender merit; but *A Mad World, my Masters*, from which Aphra Behn pilfered freely in *The City Heiress*, is conducted with singular adroitness. All these early comedies of Middleton, even the poorest of them, are distinguished by smartness and buoyancy. *The Roaring Girl* (1611), written in conjunction with Dekker, describes the exploits of Mary Frith, a noted cut-purse and virago, who is turned into an attractive heroine by the kindly playwrights. In 1613, and frequently in later years, Middleton was employed to write the Lord Mayor's pageant. The highly amusing but somewhat indecorous comedy, *A Chaste Maid in Cheapside*, printed in 1630, was probably produced in 1613; and to that year may belong *No Wit, No Help like a Woman's*, first printed in 1657. *A Fair Quarrel* (1617), written with William Rowley, presents in the person of Captain Ager a noble example of blameless magnanimity. *The World Tost at Tennis* (1620), to which Rowley contributed, is an ingenious, well-written masque, contrived with more elaborate care than was usually bestowed on such compositions. On 6th September 1620 Middleton was appointed to the office of City Chronologer. A MS. City Chronicle compiled by him was extant in the 18th century, but has since disappeared. *More Dissemblers besides Women* (*circa* 1622, probably written in conjunction with Rowley), is more elaborate and substantial than the early comedies.

The dates of *The Witch*, *The Mayor of Quinborough*, and *The Old Law* are difficult to fix. *The Witch*, first printed in 1770, is interesting from the resemblance that it offers in the incantation scenes to the similar scenes in Macbeth, which was (probably) written earlier. Some of the songs from Middleton's play were foisted into *Macbeth* by the players. *The Mayor of Quinborough* (first printed in 1661) was supposed by Dyce to be one of Middleton's earliest plays; but a passage in iv. 3 is certainly imitated from *The Tempest*. The tragic scenes contain some of Middleton's most powerful writing; the broadly comic scenes may be safely assigned to Rowley. The delightful comedy, *The Old Law*, first published in 1656 as the work of Massinger, Middleton, and Rowley, bears some indications of having been originally produced in 1599. Massinger did no more than revise the play on its revival at the Salisbury Court Theatre; and there is more of Rowley in it than of Middleton.

In the three posthumously published plays, *The Changeling*, *The Spanish Gypsy*, and *Women beware Women*, Middleton's genius is seen at its highest. Rowley had a share in the first two and probably in the third. *The Changeling* (written *circa* 1623) has not the sustained tragic power of Webster's masterpieces, and is weighted with a cumbrous comic underplot (evidently managed by Rowley); but it contains one scene (the colloquy between De Flores and Beatrice after the murder of Alonzo) that for sheer intensity of passion finds no parallel outside Shakespeare's greatest tragedies. It was one of the first plays revived at the Restoration. *The Spanish Gypsy* (*circa* 1623), a rich romantic play, opens sombrely, leading us to expect a tragical issue, but ends cheerfully; the breezy Gypsy-scenes are doubtless by Rowley. *Women beware Women* has a blithe beginning, but closes in tragic gloom. As a whole it is even more powerful than *The Changeling*.

A very curious, interesting, and skilful play is *A Game at Chess*, which was acted for nine days continuously, with unbounded applause, in August 1624. The cause of its great popularity was that it gave expression to the general feeling of satisfaction at the failure of the negotiations for the Spanish marriage. Gondomar ('the Black Knight') was satirised with scathing severity; and the Archbishop of Spalatro ('the Fat Bishop') was rudely handled. After the performance had continued for nine days a strong protest from Gondomar caused the withdrawal of the play; and both author and actors were summoned to appear before the Privy-council. Middleton shifted out of the way.

The Widow, a comedy of uncertain date, was published in 1652 as the work of Jonson, Fletcher, and Middleton; but it is difficult to assign any part to Jonson, and Fletcher's share was slight. The scene in act iv. where Latrocinio disguises himself as an empiric and dispenses his nostrums seems rather to be imitated from Ben Jonson than written by him. *Anything for a Quiet Life*, printed in 1662 and written *circa* 1619, may have been revised by Shirley.

In 1626 Middleton composed the city pageant, *The Triumphs of Health and Prosperity*. On 4th July 1627 he was buried at Newington Butts. He had married in 1602 or 1603 Mary, daughter of Edward Morbeck, one of the six clerks in Chancery; and his son Edward, the only child of the marriage, was born in 1604. The widow survived for about a year. Ben Jonson succeeded to the post of City Chronologer.

Middleton was concerned in the authorship of some of the plays included in the works of Beaumont and Fletcher. Mr Fleay plausibly assigns to him *A Match at Midnight* (usually attributed to Rowley) and the pseudo-Shakespearian *Puritan*.

Dyce's edition of Middleton's works was published in 1840 (5 vols.); an edition by the present writer appeared in 1885–86 (8 vols.). Selected Plays (2 vols.), with an Introduction by Mr A. C. Swinburne, are included in the 'Mermaid' series, edited by Mr Havelock Ellis.

Middletown, (1) a city and port of entry of Connecticut, on the right bank of the Connecticut River, 15 miles below Hartford, at the junction of three railway lines. It is a well-built town, dating from 1636, with wide, shaded streets and numerous handsome residences. Here are the Wesleyan University (1831), the Berkeley Divinity School (Episcopal), a large state hospital for the insane, and an industrial school for girls. The manufactures include sewing-machines, tape, webbing, Britannia ware, &c. Pop. (1890) 9012.—(2) A town of New York, 67 miles by rail NNW. of New York city. It contains the state homœopathic insane asylum, and has manufactures of iron, blankets, hats, &c. Pop. 8494.—(3) A town of Ohio, on the Miami River and Canal, 35 miles by rail N. of Cincinnati, with several paper-mills and tobacco-factories. Pop. 4538.

Middlewich, an old-fashioned market-town of Cheshire, on the river Dane and the Grand Trunk Canal, 21 miles E. of Chester. Its salt-manufacture has declined. Pop. 3379.

Midge, a common name for many different kinds of delicate flies, more or less gnat-like in structure, but usually harmless in habit. The adults dance in great swarms in the air; the larvæ are usually aquatic. A common little brown midge, *Corethra plumicornis*, has beautifully transparent larvæ, frequent in stagnant water; while those of *Chironomus plumosus* are bright red, known as *blood-worms*, and much sought after by birds and fishes. The name is sometimes extended beyond the limits of the family Chironomidæ to include such forms as the formidable Danubian gnat (*Simulium columbaschense*) or the allied buffalo gnat of the southern United States. See GNAT.

Midhurst, a market-town of Sussex, on the Rother, a navigable tributary of the Arun, 65 miles by rail SW. of London and 12 N. of Chichester. Cobden was born close by, and Lyell was educated

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at the grammar-school (1672). Cowdray House, ½ mile NE., was built about 1530 by the Earl of Southampton, and for 239 years had been the seat of eight Viscounts Montague, when in 1793 it was reduced by fire to a beautiful ruin. Till 1885 Midhurst borough (35 sq. m. in area) returned a member to parliament. Pop. of parish (1851) 1481; (1881) 1615.

Midi, Canal du. See Garonne.

Midianites, an Arab race, descended, according to Scripture, from Midian, the son of Abraham by Keturah. They occupied great part of the country between the Red Sea and the Plains of Moab, and had their headquarters east of what is now the Gulf of Akabah. They were at least partly nomadic, but their caravans brought gold and incense from the south to Palestine, and traded between Egypt and Syria. Some of them lived near Sinai; to them belonged Jethro, priest or sheik of Midian—the father-in-law of Moses. The Midianites were very troublesome neighbours to the Israelites till Gideon's victory over them. Their national god was Baal-Peor. In Midian proper, to the east and south-east of the Gulf of Akabah, the Romans had valuable mines. Sir Richard Burton was convinced that gold was still to be found there, and as an outcome of visits paid in this interest wrote his *Gold Mines and Ruined Cities of Midian* (1878), and *Midian Revisited* (1879). Later travellers have not confirmed his opinion; but petroleum seems to occur. Midian ceased to be Egyptian and became Turkish again in 1887.

Midlothian. See Edinburghshire.

Midnapur, capital of a district in Bengal, on the Kasai River, 68 miles W. of Calcutta by road and canal. There are some manufactures, and an American mission to the Santals. Pop. 33,560.

Midrash, the Hebrew exposition of the Old Testament. See Exegesis.

Midshipman, the second rank attained by combatant officers in the royal navy. As a cadet he remains two years in the *Britannia*, the cadet training ship. On passing out, if he obtains a first-class certificate, he is rated midshipman at once; if he only obtains a second-class certificate, he serves six months at sea as naval cadet and then passes for midshipman; if he only gets a third-class certificate, he cannot pass for midshipman until he has been twelve months at sea. A midshipman has to serve four years and six months in that rank, inclusive of the time allowed him on leaving the *Britannia;* then if he is nineteen years of age he can pass his examination as acting sub-lieutenant. He next joins the college at Greenwich, where he receives a nine months' course in mathematics, navigation, &c., at the end of which time he has to pass his final examination in those subjects to qualify him for the rank of lieutenant. From Greenwich he proceeds to the torpedo school for a three months' course before passing his final examination in that branch; then to the gunnery school for another nine months' course in gunnery before his final examination. Lastly, he has to go through a three months' course in pilotage. If he is lucky enough to obtain a first-class certificate in all five branches—viz. seamanship, mathematics, torpedo, gunnery, and pilotage—he obtains his lieutenant's commission at once as his reward; otherwise he has to wait two or three years, as a rule, as a sub-lieutenant before being promoted. A midshipman's time is principally devoted to his instruction, and he is undergoing a period of probation for his future career. He is examined every six months in all subjects to ascertain the progress he is making, and is liable to be summarily dismissed if he is found not to be making satisfactory progress or to be not likely to make an efficient officer. There is no open competition for cadetships as for commissions in the army; but cadets are nominated, and there is a limited system of competition, three candidates being allowed to compete for every vacancy. Midshipman is the only naval title peculiarly English; from what it takes its origin it is difficult to say. He ranks with a second-lieutenant in the army. In France he is styled 'enseigne de vaisseau,' and in other navies he remains cadet until he becomes a sub- or under-lieutenant. A midshipman receives only 1s. 9d. a day (£31, 18s. 9d. per annum); he is consequently dependent on his friends for more or less pecuniary assistance until he becomes a sub-lieutenant.

Midsummer Day—24th June—is one of the four English quarter-days. For Midsummer Eve, see John's (Eve of St).

Midwifery. See Obstetrics.

Mieris, Frans van, Dutch painter, born at Leyden, 16th April 1635, and died there, 12th March 1681, painted genre pictures and portraits, all of small size. He was a pupil of Gerard Dow, but, though a very able painter, scarcely rises to the level of his master. His son, Willem (1662–1747), and Willem's son, Frans (1689–1763), followed closely in his footsteps.

Miescher's Vesicles. See Gregarinida.

Migne, Jacques Paul, to whom Catholic theology owes a great debt of gratitude, was born at St Flour in Cantal, 25th October 1800, and died in Paris on his seventy-fifth birthday. He was educated at the seminary at Orleans, was ordained priest in 1824, and served some time as curate at Puiseaux in the diocese of Orleans. A difference with his bishop about a book on the liberty of the priests drove him to Paris in 1833, where he started *L'Univers Religieux*, afterwards called simply *L'Univers*. In 1836 he sold the paper, and soon after set up a great publishing house at Petit Montrouge, near Paris, which gave to the world, besides numerous other works of theology, *Scripturæ sacræ cursus completus* and *Theologiæ cursus* (each 28 vols. 1840–45), *Collection des Orateurs sacrés* (100 vols. 1846–48), *Patrologiæ cursus completus* (Latin series, 221 vols., 1844 *et seq.;* 2d ed. 1878 *et seq.;* 1st Greek series, 104 vols., 2d series, 58 vols., both since 1857), and the *Encyclopédie théologique* (171 vols. 1844–66). Unfortunately these editions were prepared too hastily, and moreover by superficial scholars, so that they do not possess critical value. The Archbishop of Paris, thinking that the Abbé Migne's great undertaking had become a mere commercial speculation, forbade it to be continued, and, when the indefatigable director refused to obey, suspended him. A great fire, more powerful than the veto of the archbishop, put an end to the work in February 1868.

Mignet, François Auguste Alexis, a great French historian, was born 8th May 1796, at Aix in Provence, studied at Avignon, and then law at Aix along with Thiers. Both were admitted to the bar at the same time (1818), but Mignet's true vocation was at once apparent in the no less solid than brilliant prize-essay for the Academy of Inscriptions on the institutions of France in the time of St Louis. In 1821 he went to Paris, and soon began to write for the *Courrier Français*, and to lecture with applause on Modern History at the Athénée. In the spring of 1824 appeared his *Histoire de la Révolution Française*, a sane and admirable summary—the first complete history by one other than an actor in the great drama. Mignet joined the staff of the *National*, and with

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Thiers signed the famous protest of the journalists on July 25, 1830. After the revolution of 1830 he became Keeper of the Archives at the Foreign Office, but lost this in 1848. In 1833 he went on a confidential mission to Spain, and used the opportunity to explore the famous Simancas Archives. Elected to the Academy of Moral Sciences at its foundation in 1832, he succeeded Comte as its perpetual secretary in 1837, and was elected to fill Raynouard's chair among the Forty in 1836. He died 24th March 1884, within three months of Henri Martin. Mignet was the first great specialist in French history who devoted himself to the complete study of particular periods, and in his work he displayed a marvellous mastery of documents.

His works include *Négociations relatives à la Succession d'Espagne sous Louis XIV.* (1836–42); *Antonio Perez et Philippe II.* (1845); *Vie de Franklin* (1848); *Histoire de Marie Stuart* (1851); *Charles Quint, son Abdication, son Séjour et sa Mort au Monastère de Yuste* (1854); *Éloges Historiques* (1843 and 1864); and *Rivalité de François I. et de Charles V.* (1875). For a great projected history of the Reformation, he is said to have collected hundreds of volumes of manuscript correspondence. See Trefort, *Mignet und seine Werke* (Budapest, 1885); the Life by E. Petit (Paris, 1889); and Jules Simon, *Mignet, Michelet, Henri Martin* (1889).

Mignonette (*Reseda odorata*), a plant of the natural order Resedaceæ, a native of the north of Africa, in universal cultivation on account of the delicious fragrance of its flowers. Though usually cultivated as an annual, it is really a perennial, and assumes a sub-shrubby character when protected from cold and wet in winter. It is to be seen during summer in almost every garden, and during winter in almost every greenhouse in Britain; it is often cultivated in flower-pots in apartments, and no flower is so common in the boxes which are placed outside of windows in towns. Yet it was first introduced into England by Lord Bateman, who brought it from the Royal Garden at Paris in 1752; nor had it then been long known in France. It rapidly became a universal favourite throughout Europe. The French name mignonette, now its popular name everywhere, signifies *Little Darling*. What is called *Tree Mignonette* is not even a distinct variety, but merely the common kind trained in an erect form, and prevented from early flowering by pinching off the ends of the shoots.—Weld (q.v.) belongs to the same genus.

Migration of Animals. An animal is usually described as 'migrating' when it shifts its quarters at particular periods of the year. This, in the northern hemisphere, takes place in spring and autumn, the directions at these seasons being respectively north and south; in the opposite hemisphere the course taken by the migrants is reversed, while in most warm and temperate regions herbivorous mammals, to escape insects and to obtain fresher vegetation (and following them the predatory carnivora), ascend in summer to higher altitudes, descending again when the snow covers their grazing ground. Examples are afforded by the deer in North America and Scandinavia, the alpine hares in Scotland, the Himalayan monkeys, &c. But, just as in Hibernation (q.v.) there is every gradation between ordinary sleep and the long-continued dormancy so designated, so it is possible to trace numerous steps connecting the ordinary roaming about of an animal in search of food with the persistent flight or march in one definite direction at a date so determinate that it may be reckoned upon to within a few days. There are, however, in addition, migrations of an irregular character, stimulated by causes still imperfectly understood, though in the majority of cases the necessity of seeking more abundant food-supplies—the *primum mobile* of all roaming—is at the bottom of what seems at first sight a whimsical movement.

Birds are the most marked migrants. The phenomena exhibited by them in this respect have been sufficiently described in Vol. II. p. 172. Various species (the robin and the song thrush, for example) which stay in Great Britain during winter are in various continental countries migrants. Again, all winter there is a drifting over from the mainland to the British shores of species which are not recognised as birds of passage, this shifting of quarters, in a manner akin to migration, except that it is indeterminate as to season, being probably due to a lack of food when continental Europe is covered with snow. This reason may also be assigned for those irregular appearances of the wax-wing and the nutcracker in the British Isles, and for those sudden arrivals from central Asia in Europe, on to the western limits of Great Britain, of the Pallas sand-grouse, which were the ornithological events of 1859, 1863, and 1888.

Mammals are less migratory, their movements being restricted by the impossibility of crossing the ocean. The reindeer, however, in many parts of the Arctic continent, moves north at the beginning of summer and south at the approach of winter, and in the Hudson Bay region the Arctic fox—the young more especially—often retreats southward in October, returning northward in spring, though in Greenland, Spitzbergen, and the Arctic regions generally both animals are winter residents, the fox shifting its quarters very little, and the reindeer only from one valley deeply covered with snow to another in which the lichens and the withered vegetation can be reached more easily. The polar and other seals and cetacea make regular migrations, the latter following the melting ice-fields, while each species of the former reaches the coast at different dates, though their winter haunts are still problematical. But most northern mammals are hibernators when they cannot find sufficient food-supply during winter. The irregular migrants are the most remarkable. Among these the Lemming (q.v., *Myodes lemmus*) is the best known. These animals, at intervals of five, twenty, or even a greater number of years, suddenly start from their home in Northern Scandinavia, in vast droves, followed by myriads of predatory birds and mammals, and steadily pursue a southward course until they meet the sea, when they boldly plunge in and are often drowned in enormous numbers. None ever return. The North American gray squirrel (*Sciurus migratorius*) will often remain for years in one district, and then suddenly migrate in millions. These two cases—and the lemmings of North America (*M. torquatus*, var. *hudsonius*) exhibit traits similar to their European congeners—may, like the corresponding influx of rats and mice in various districts, of the Hesperomys in Brazil, and of the flying foxes (gigantic bats of the genus Pteropus) in parts of Australia, be ascribed to the food-supplies in a particular area having suddenly failed or become unequal to the demands upon them; for it is hard to credit the theory that the southward incursions of the lemmings are stimulated by their instinctive eagerness to reach a long vanished 'Atlantis,' to which, in former days, their ancestors periodically resorted, and of the existence of which they possess an inherited though inaccurate remembrance. The American bison was also in the habit of migrating southward and northward after the fashion of the reindeer and Asiatic wild-ass (*Asinus Onager*), and no doubt for identical reasons. But the irregular migrations of the quagga and the South African antelopes, followed by herds of lions and other carnivora, are,

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or were, due to a scarcity of water and naturally of food also. The occasional inroads of bears and wolves on settled districts are not migrations proper, for their boldness is stimulated solely by hunger through the scarcity of food during more than usually severe winters; and to an allied cause may be traced the long excursions of various monkeys (Entellus and Rhesus) at irregular periods.

Many fishes are regular migrants. The salmon, the shad, some smelts (the North-west American oolachan, *Osmerus pacificus*, for example), eels, the sea lamprey, the sturgeon, the river trout, &c., all migrate from the sea up rivers at the spawning season, while the roach and the ide of Scandinavia migrate from lakes into the tributary streams for the purpose of depositing their ova. The herring, sprat, pilchard, and other Clupeidæ move from deep water in spring to shallower places more inshore, in order that the greater warmth of the water may hatch the spawn; while other species (e.g. the sudden arrival of the *Temnodon saltator* off the southern coast of Morocco in 1887, and succeeding seasons, after an absence for twenty-seven years) appear and disappear periodically, though in all probability most fishes are more or less migratory.

Among reptiles, turtles are the only known migrants, moving on shore at fixed periods to deposit their eggs in the sand, and disporting themselves in the sea during the rest of the year.

Among Invertebrata there are no regular migrants; but many of them perform irregular migrations of considerable interest. The destructive flights of various species of Locusts (q.v.) and Grasshoppers (q.v.) in search of green food, the occasional flights of butterflies, and the quasi-marches of the termites-ants are cases in point. In July 1890, near Romershof, in the Riga district, there was witnessed a flight of small beetles. The mass in motion was about 2 miles long, 1½ mile broad, and 7 yards thick. It moved in a northerly direction, obscuring the sun, and at times settling on the fields. The flights of the various species of locust (especially *Pachytylus migratorius*) are, however, not always impelled by hunger, for though they generally breed in a sandy district when food is scarce, and are therefore compelled to seek another where it is more plentiful, the reverse course is sometimes taken, as if the species was seeking the barren home of its ancestors. Temperature may also have something to do with locustal migrations, and there is a tendency for the flights to take particular directions. The nearest approach to periodical migration known is the curious movement of butterflies across the Isthmus of Panama and seaward in June and the beginning of July many years in succession. But it is not known where they go to, though butterfly showers have been met with in the Pacific several miles from land, and other flights have crossed Ceylon of such an extent that, though miles in breadth, they occupied several continuous days in their passage. It may be taken for granted that all marine animals, like all terrestrial ones, shift about in search of food, when not permanently fixed in their adult condition. Yet, with the exceptions mentioned, it is difficult to point to any which are migrants in the true sense of the term. A curious inroad of crustaceans—a species of Sesarma—has been noticed off Cuba, where, at Cape San Antonio, they invaded the houses and the light-tower. Land-crabs are sometimes migratory. The violet species of the West Indies (*Gecarcinus ruricola*) lives several miles inland, returning to the sea once a year to deposit its spawn. Other species are found at heights of 4500 feet, in the Deccan, though they do not appear to visit the sea, being fresh-water spawners. But in Ascension land-crabs climb up Green Mountain and steal rabbits from their holes, and in Japan the crab Telphusa is found on the tops of mountains several thousand feet high, and in Greece and Italy by streams far inland.

Migration is, therefore, in the vast majority of cases, due (1) to the necessity of searching for food and (2), as in the case of fishes, crustacea, reptiles, &c., of finding a suitable place for depositing their eggs. The causes which impel birds to migrate are more complicated, though the two mentioned are the leading ones. With mammals, in all likelihood, this trait is of an origin so remote that it preceded the present distribution of land and water. This is shown by the range of various extinct groups. Thus, true horses of the genus Equus are of older-Pliocene date in Europe, but of Post-Pliocene, or even of later appearance, in America, into which they have migrated, though on that continent they expired comparatively soon. But tapirs, though now essentially an American group, being more abundant there than in Asia, are in the Old World Lower Miocene, while in the New World they do not extend further back than the Post-Pliocene epoch. Lastly—and the list might be largely extended—camelidæ, though now confined to Asia and South America, are really an American group, having been largely developed in the Miocene age of the northern part of the continent, whereas the true camels, according to Wallace, seem to have passed into Asia and the llamas into South America. We may, indeed, infer with confidence that in the most remote periods of the world's history migration existed; indeed, if we accept (though few palæontologists do) the conclusions of Barrande, they lend countenance to the belief that at a date incalculably distant by our methods of measuring time this animal trait was established among the trilobites and other palæozoic invertebrates. It is thus, in some instances, permissible to suggest that the habit is a 'survival,' though it is difficult to point to a case in which it is at present practised without the animal benefiting thereby. For just as hibernation, by enabling an animal to live within its area, serves an important purpose in the struggle for existence, so migration, by enabling it to escape vicissitudes of climate and the revolutions of the globe which would be fatal to it or to its offspring, renders the species more likely to survive longer than it would otherwise be capable of doing.

See De Serres, *Des Causes des Migrations des Animaux* (1842); Brown, *Short Studies from Nature*, and *Our Earth;* Palmén, *Om Foglarnes flyttningsvägar* (1874), with bibliography of subject so far as birds are concerned; Harting, *Our Summer Migrants* (1877); Duns, *Science for All; Reports of the British Association Committee on the Migration of Birds* (1883 *seqq.*); Richardson, *Fauna Boreali-Americana;* Von Wrangel, *Expedition to the Polar Sea;* Eschricht, *Forhand. Skandinaviske Naturhistoriske Forening* (1847); Rink, *Danish Greenland* (1876); Collett, in *Journal of the Linnean Society* (Zoology), vol. xiii.; Crotch, in *Journal of the Linnean Society* (Zoology); Von Ihring, in *Kosmos* (1885); *Challenger* Report, vol. i. p. 927; Nicholson and Lydekker, *Manual of Palæontology* (1889); and the article GEOGRAPHICAL DISTRIBUTION.

Miguel, MARIA EVARIST, usurper of the throne of Portugal, was born at Lisbon, 26th October 1802, the third son of King John VI. A determined hater of all constitutional principles, he plotted (1824) to overthrow the constitutional form of government granted by his father: he caused the ministers to be arrested and his father to be closely watched in his palace; but the aged king escaped to an English man-of-war anchored in the estuary. Miguel and his mother, his principal abettor, were banished. At the death of John VI. in 1826, the

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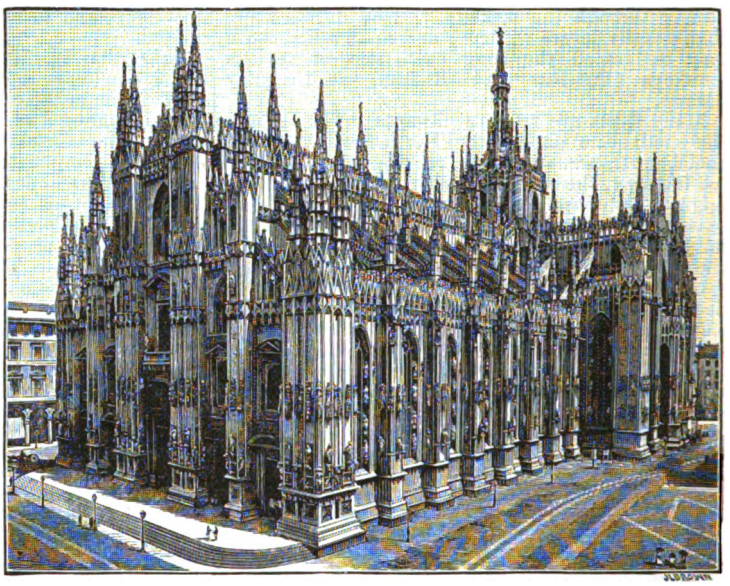
throne devolved upon Miguel's elder brother, Pedro, the emperor of Brazil; he, however, resigned it in favour of his daughter, Maria, but making Miguel regent till her majority. Miguel at once dissolved the constitutional cortes, summoned the cortes that had preceded it, and was on 30th June 1828 by it proclaimed king. But Pedro of Brazil gathered an army at the Azores, and in 1832 captured Oporto and Lisbon, and Charles Napier destroyed Miguel's fleet off Cape St Vincent (1833). Next year Maria was restored to the throne, and Miguel withdrew to Italy, protesting. He died on 14th November 1866 at Bronnbach, near Wertheim in Baden, having been a spoilt youth, a wildly dissolute man, and a tyrannical ruler.

Miklosich, FRANZ VON, the greatest of Slavonic scholars, was born at Luttenberg, in the Slovenian part of Styria, 20th November 1813. After studying law at the university of Gratz, he went in 1838 to Vienna to practise as an advocate, but was led by Kopitar to the study of philology, and in 1844 obtained a post in the Imperial Library. From 1850 to 1885 he was professor of Slavonic at Vienna, in 1851 being elected to the Academy of Sciences, and in 1869 made a 'Ritter.' His works, nearly thirty in number, include *Radices Linguæ Palæoslovenicæ* (1845); *Lexicon Linguæ Palæoslovenicæ* (1850); *Vergleichende Grammatik der Slawischen Sprachen* (4 vols. 1852–74), which has done for Slavonic what Grimm and Diez have done for the German and the Romance languages; *Die Bildung der Slawischen Personennamen* (1860); *Ueber die Mundarten und die Wanderungen der Zigeuner Europas* (12 parts, 1872–80); *Rumunische Untersuchungen* (1882); and *Etymologisches Wörterbuch der Slawischen Sprachen* (1886).

Miknas, Mequinez, or MIKNASA, a town of Morocco, 32 miles W. by S. of Fez and 70 miles from the coast, stands amidst olive groves on the slope of a hill. It is surrounded by walls, and is perhaps the best built town in Morocco. The palace is the summer residence of the sultan, and the mosque of Muley Ismail is the burial-place of the royal house. Pop. about 30,000. For the early history of the place, see *Journ. Asiatique* (1885).

Milan, the second in size of Italian cities, Naples ranking first and Rome third, stands in the great plain of Lombardy, 80 miles NE. of Turin, 155 W. of Venice, and 25 S. of Lake Como at the foot of the Alps. The city, nearly circular in shape, is surrounded on three sides by walls, has a circuit of nearly 8 miles, and is entered by 14 gates. Although a place of great antiquity, it does not possess many very old buildings: it has been too greatly ravaged by war. The modern city is a busy, enterprising, and wealthy community. The streets are broad and regular, and the houses substantial and roomy. The principal church is the cathedral of the archbishop, the foundation of which was laid, on a site where already two cathedrals had stood, by Gian Galeazzo Visconti in 1386; it was completed by order of Napoleon I. in 1805–13. It is built entirely of marble, and in the Gothic style, with an approach to Flamboyant in the ornamentation; but the windows and portals of the façade (16th century) are Italian. The



Milan Cathedral.

exterior is adorned with some 6000 statues in niches and a vast number of pinnacles. Other noticeable churches are St Ambrose, founded in 868, on the site of one dedicated by the saint himself in 387—it has early mosaics, an altar with clever goldsmith's work, and other antiquities; St Eustorgius, dedicated in 320, with interesting sepulchral monuments; St George, founded in 750, but greatly modernised, with pictures by Luini and Ferrari; St Maria delle Grazie (built 1463), on the walls of whose refectory is Leonardo da Vinci's 'Last Supper;' and St Maurice the Greater (1497–1506), adorned with paintings by Luini and his school. The principal secular building is the Brera Palace (12th century), formerly a Jesuit college, now the palace of arts and sciences, which shelters within its precincts a very valuable gallery of paintings by such masters as Raphael, Da Vinci, Luini, Mantegna, the Bellinis, Titian, Vandyck, &c., an academy of art, a collection of casts for modelling, the magnificent monument of Gaston de Foix, the national library (1770) of 162,000 vols. and 3650 MSS., an archæological museum, and an observatory. In Frederick Borromeo's creation, the famous Ambrosian Library (1609), there are 164,000 vols. and 8100 MSS., besides collections of drawings, engravings, and pictures. The city is adorned with numerous palaces, as that of the archbishop (1570); the royal palace, with fine modern frescoes; the Late Renaissance municipal palace (1558); the former castle of the Visconti (15th century), with frescoes by Luini; the Poldi-Pezzoli palace, with a collection of paintings of Leonardo da Vinci's school, armour, and artistic objects; and several others. The arcaded colonnade of Victor Emmanuel (1865–67), lined with fine shops, forms a favourite promenade of the people. The Arch of Peace, built of white marble (1807–38), commemorates the exploits of Napoleon. The Della Scala opera-house (1778) is the second largest (next after San Carlo at Naples) in Italy. Beccaria, Manzoni, the popes Pius IV. and Gregory XIV. were natives of Milan. The principal of the scientific and artistic institutions

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are an academy, a higher technical institute, several scientific societies, a museum of natural history, schools of veterinary practice, music, and a military geographical institute. The charitable institutions are numerous and splendidly endowed, having an aggregate property of £7,000,000 sterling; the Great Hospital (founded in 1448) can accommodate 2500 patients. Owing to its central situation in the upper valley of the Po, to the fact that it is the principal meeting-place of the north Italian railways and canals, and owing to its proximity to the Alpine passes, Milan has always been a place of much commerce. It now carries on a vast trade, much increased since the opening of the Gothard railway, in raw silk, cotton, grain, rice, and cheese, and manufactures silks, velvets, gold, silver, and iron wares, railway carriages, tobacco, porcelain, electric-light apparatus, and is an active centre of the printing-trade. Milan is the chief financial and banking city of North Italy. Pop. (1876) 283,225; (1881) 295,543. This is the pop. of the city (214,084 in 1881) and the suburbs; the commune had (1881) 321,839 inhabitants; (1890) 360,000.

Milan (Lat. *Mediolanum*) was originally a town of the Insubrian Gauls. It was conquered by the Romans, 222 B.C., and under them became a conspicuous centre of wealth and civic influence; its citizens were noted for their refined manners and literary tastes, and the public buildings for their beauty and elegance. In the beginning of the 4th century it was selected as the residence of the imperial court by Maximian. It was sacked by the Huns (under Attila) in 452, by the Goths in 539, and passed to the Longobards (569), and to the Franks previous to its subjection by the German empire. Here several of the German emperors were crowned with the Iron Crown. The city was in the 11th century the head of the Lombard League of towns that opposed Frederick I., who twice besieged it, and once razed it to the ground. Nevertheless it continued to prosper, notwithstanding that it was distracted by the intestine feuds of the Guelphs and Ghibellines. Supreme power became eventually (from 1277) vested in the Ghibelline Visconti, who extended the ascendency of Milan over the whole of Lombardy, and in 1395 bought from the emperor the title of duke. The successors of the Visconti in the lordship of Milan were the Sforzas (1450–1535). From 1555 to 1713 Milan submitted to the predominance of Spain, and from Spain passed to Austria. Under Bonaparte it was declared the capital of the Cisalpine Republic, of the Italian Republic, and, finally, of the Kingdom of Italy. In 1815 Milan was restored to Austria, and continued the capital of the Austro-Italian kingdom until the annexation of Lombardy to Piedmont in 1859 by the peace of Villafranca. The 1848 troubles in Italy originated in a revolt of the Milanese against the tyranny of the Austrians. —The *province* has an area of 1213 sq. m. and a pop. (1881) of 1,114,991; and (1889) 1,228,218. See Histories by Rosmini (4 vols. 1820), Cantù (2 vols. 1844), and Cusani (7 vols. 1862–67).

Milazzo (anc. *Mylæ*), a fortified seaport of Sicily, on a promontory 21 miles W. of Messina. Off Mylæ in 260 B.C. the Romans won a great seafight over the Carthaginians; and here on 20th July 1860 Garibaldi, with 2500 men, defeated 7000 Neapolitans, and compelled the garrison to evacuate the fortress. Pop. 7971.

Mildew (A.S. *Meledeaw*, 'honey-dew'), a general name applied to numerous diseases of plants caused by or associated with the parasitism of certain fungi. The name is obviously most appropriate in reference to those fungi which form white mealy patches on the plants. Some of the most important are species of Erysiphe, and are common both on leaves and green stems of many Dicotyledons and a few Monocotyledons. The filaments of the fungus branch and spread over the epidermis of the plant, sending suckers every here and there into the cells. They multiply by the asexual formation of spores, and in most cases also from sexually produced fructifications. Among the common forms may be noted: *Erysiphe lamprocarpa* on Compositæ, Plantago, Verbaseum, Labiates; *E. graminis* on grasses; *E. martii* on Umbelliferæ and Leguminosæ; *E. communis* on Polygonum, Rumex, Convolvulus, Teasel, Ranunculus, &c.; *E.* (or *Oidium*) *tuckeri* on the vine; *Podosphæra kunzei* on Prunus; *P. castagnei* on hops. These are all nearly related, but the mildew or rust of corn (*Puccinia graminis* or *Æcidium berberidis*), whose life is divided between barberry and cereal, belongs to a distinct series. See FUNGI.

Mile, a terrestrial measure of length, is derived from the Roman *milliare*, which contained 1000 paces (*mille passuum*) of 5 Roman feet each, the pace being the length of the step made by one foot. The Roman foot being between 11·65 and 11·62 English inches, the Roman mile was thus less than the present English mile by from 142 to 144 yards. The length of the modern mile in different countries exhibits a remarkable diversity not satisfactorily accounted for. Before the time of Elizabeth, scientific writers made use of a mile of 5000 English feet, from the notion that this was the Roman mile, forgetting the difference in value between the English and Roman foot. The present statute mile was incidentally defined by an act passed in the thirty-fifth year of the reign of Elizabeth to be '8 furlongs of 40 perches of 16½ feet each' —i.e. 1760 yards of 3 feet each; and it has since retained this value. The *geographical* or *nautical mile* or *knot* is the sixtieth part of a degree of the equator (= 1·153 English statute mile), and is employed by the mariners of all nations; but in Germany the geographical mile denotes $\frac{1}{15}$th part of a degree in the equator, or 4 nautical miles.

Mileage, in the United States, signifies fees paid to officials—and in particular to members of congress—for their travelling expenses, at so much per mile. The system has in the past led to gross abuses, each senator and representative estimating for himself the distance he had travelled. Now, however, there is a fixed table of mileage, and the largest allowance paid is $1440; the total annual cost, for both houses of congress, is nearly $150,000. In all countries of Europe, except Britain, the same system prevails with regard to members of the popular chambers, at least, they being paid either their travelling expenses or a fixed annual sum.

Milesians, another name for the Scots, the last of the prehistoric invaders of Ireland (q.v., Vol. VI. p. 203); from an assumed eponymous ancestor *Milesius*, whose name is a modification of *Miles*, a Latin translation of the Celtic *Gulam*.

Miletus, anciently the most flourishing city of Ionia, in Asia Minor, situated near the mouth of the Mæander, was famous for its woollen cloth and carpets, and its furniture, and for its extensive trade. Before being forcibly colonised by the Ionians (q.v.) under Neleus, it appears to have been inhabited by Carians or by Leleges. Its people early founded nearly fourscore colonies on the Black Sea and in the Crimea—Abydos, Lampsacus, Cyzicus, Sinope, Amisus, Olbia, Panticapæum, &c.—sent merchant fleets to every part of the Mediterranean, and even into the Atlantic, and maintained an obstinate war with the early Lydian kings, until Crœsus was at length acknowledged as their master. They were believed to be the purest representatives of the Ionians in Asia.

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After the conquest of Lydia by the elder Cyrus, Miletus submitted to Persia; but in 500 B.C. it was stirred up to rebellion against the Persians. Six years later Darius besieged the city, stormed it, plundered it, massacred most of its inhabitants, and banished the survivors to the mouth of the Tigris. Afterwards the city was rebuilt, but never reacquired its former importance, although its people frustrated the attempt of the Athenians to compel their allegiance, and dared to resist Alexander till he stormed the city. It kept the rank of a second-rate commercial town down to the time of Pliny, and was finally ruined by the Turks. Miletus was the birthplace of the philosophers Thales, Anaximander, and Anaximenes, and of the historians Cadmus and Hecatæus. Short tales, mostly in dialogue, and of a witty and obscene character, were greatly in vogue amongst the Greeks under the name of 'Milesian tales.'

Milfoil, a name applied to several kinds of plants as the Common Milfoil (*Achillea millefolium*), the Hooded Milfoil (*Utricularia*), and the Water Milfoil (*Myriophyllum*). The first-named is invariably understood by the term when it is used without any qualifying adjective. The plant belongs to the natural order Compositæ. It is one of the commonest of British plants, and is very abundant in Europe and Russian Asia from the Mediterranean to the Arctic Circle, and extends over a great part of North America. The plant is medicinal, being mildly aromatic, tonic, and stimulant; and yields tannin, a bitter extractive, a volatile oil, and an acid called *achilleic acid*. In Sweden the plant is employed as a substitute for hops in the making of beer.

Milford, a parliamentary borough (contributory to Pembroke) and seaport of South Wales, in the county of Pembroke, is pleasantly situated on the north side of Milford Haven, about 7 miles ENE. of St Ann's Head, and (by rail) 271 miles W. of London. The town itself, which, with 500 acres of adjoining land, has been acquired by a company as lessees for 999 years, presents no features of interest; the Haven, which as a natural harbour is unequalled both in area, complete shelter, and facility of entrance, being by far the greater attraction. Stretching inland some 10 miles, it varies in breadth from 1 to nearly 2 miles, and has a depth in most places of from 15 to 19 fathoms—even at low-water spring-tides there being a minimum depth of 8 fathoms—whilst commanding all its lower reaches are several batteries, all armed with heavy guns, thus securing Pembroke as well as Milford from any seaward attacks. In 1485 the Earl of Richmond (afterwards Henry VII.) disembarked here from Brittany shortly before the battle of Bosworth. Docks designed by Sir E. J. Reed, and capable of accommodating vessels of the largest size, were completed in 1882, but not opened to shipping until 21st September 1888: their total area is 60 acres, and the depth of water inside 28 feet. Despite their construction, however, the trade of the port has as yet, apart from the increasing passenger and cattle traffic with the Irish ports of Cork and Waterford, made but little progress; but a proposal to run a fast line of steamers between Milford and Labrador has met with considerable support. Pop. (1881) 3812.

Milford, a town of Massachusetts, 36 miles W. by S. of Boston, with boot-factories. Pop. 9343.

Military Frontier. See CROATIA.

Military Law. See MARTIAL LAW, COURT-MARTIAL, and MUTINY.

Military Orders, religious associations whose members united in themselves the double characters of monk and knight. These orders arose about the period of the Crusades, the first to be formed being the Hospitallers (q.v.). Their primary duties were to tend sick pilgrims at Jerusalem, afterwards to protect them also on their way to the holy city. The order of the Templars (q.v.) soon followed; their purpose was to protect pilgrims, a duty to which was afterwards added that of guarding the Temple at Jerusalem. The orders of Alcantara, of Calatrava, and of Santiago of the Sword, in Spain, had for their immediate object the defence of their country and creed against the Moors. These orders, as well as that of St Bennet of Aviz in Portugal, which was instituted with a similar view, differed from the Templars and the Knights of St John (Hospitallers) in that their members were permitted to marry. The same privilege was enjoyed in the Savoyard order of Knights of St Maurice, and the Bavarian order of St Hubert. On the contrary, the Teutonic Knights (q.v.), who had their origin in the Crusades, but afterwards made the south-east and east shores of the Baltic the theatre of their activity, were bound by an absolute vow of chastity. These religious associations have mostly been abolished or have fallen into disuse, though some still subsist as orders of knighthood. See Bertouch, *Gesch. der geistl. Genossenschaften* (1888), and Lawrence-Archer, *The Orders of Chivalry* (1888).

Military Schools in connection with the British army are of three classes. First, the Royal Military Asylum (Duke of York's School) at Chelsea, and the Royal Hibernian Military School, Dublin, where the sons of soldiers who have died in the service receive a general education free of charge, and may or may not afterwards enter the army. The commandants of these establishments are officers of the army, but the masters are civilians. Secondly, the Royal Military Academy, Woolwich, the Royal Military College, Sandhurst, and the Army Medical School at Netley, where gentlemen qualify for commissions by undergoing special instruction. Thirdly, those establishments where officers, non-commissioned officers, or men, already in the service, receive technical instruction in various branches of military art—viz. the Staff College at Camberley, the School of Gunnery at Shoeburyness (the Artillery College), the School of Military Engineering at Chatham, the School of Musketry at Hythe, the School of Gymnastic Instruction, the Schools of Signalling and of Range-finding, the Army Veterinary School, and the School for Auxiliary Cavalry, all at Aldershot; a similar school for other auxiliary forces at Wellington Barracks, London; and the Royal Military School of Music at Kneller Hall, Hounslow. All are under officers of the army, and, with very few exceptions, the staff of instructors are also officers or sergeants. Those under instruction join the schools for periods varying from a month to two years, and then rejoin their regiments. The following is a description of the more important of these establishments: the Royal Military Academy, Woolwich, is described at ARTILLERY.

The Royal Military College at Sandhurst, in Berkshire, 5 miles SSE. of Wokingham, and 33 WSW. of London, was established in 1858 by a remodelling of the Junior Department of the Royal Military College (transferred hither from Great Marlow in 1812), in order to give a sound military education to youths destined to receive commissions in the British army. The age of admission was between sixteen and nineteen. On production of satisfactory certificates and references, a youth's name was permitted by the commander-in-chief to be placed on the list of candidates for the entrance examination. These examinations were held half-yearly, and the list of subjects included English composition, modern

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languages, mathematics, history, geography, natural and experimental sciences, and drawing. The examination was competitive, and those who had the most marks were admitted as cadets as soon as vacancies occurred in the college. The course of study lasted two years, and embraced a variety of subjects connected with military science. The friends supplied clothing, books, and instruments, and paid annually for education, board, and lodging from £20 to £100. The highest sum was paid for 'the sons of private gentlemen,' the lowest for 'the sons of officers of the army or navy who had died in the service, and whose families were proved to be left in pecuniary distress.' Twenty were 'Queen's cadets,' sons of officers 'who had fallen in action, or had died from the effects of active service, and had left their families in reduced circumstances.' These were admitted on passing a qualifying examination, and educated gratuitously. In 1870 a different system was tried, but, the results not being satisfactory, it was very quickly condemned and the old system reverted to. The length of the course of study has, however, been reduced to one year, and the cadets have much more freedom than formerly, when they were treated in all respects like soldiers in barracks. See CADET.

Admission to the Royal Military College, Sandhurst, is obtained by open competition at examinations held each half-year under the direction of the Civil Service Commission. Candidates must first have passed the same 'preliminary' examination as for the Royal Military Academy, Woolwich, or one recognised as equivalent to it, and the medical examination. They must be between the ages of seventeen and twenty, unless graduates of the universities, when they may be as old as twenty-two. The number of trials is three for ordinary candidates, but only two for university graduates. The 'further' examination includes mathematics, classics, modern languages, English history and composition, experimental sciences, geology, and drawing—divided into twelve subjects, of which seven may be taken up. Successful candidates for the Royal Military College remain there for one year, and, subject to passing the half-yearly examinations in fortification, tactics, military administration, law, and topography, and becoming proficient in drills and exercise (including riding, gymnastics, and musketry), are then given commissions as second-lieutenants in the cavalry or infantry. They are liable, however, to removal for grave misconduct or incapacity.

At the Army Medical School, Netley, Southampton, medical candidates already professionally qualified are further instructed in pathology, military surgery, medicine, and hygiene. All invalid soldiers from abroad are sent to the hospital at Netley, to which the Army Medical School is contiguous. After passing the prescribed course and examinations, the candidates are commissioned as surgeons in the medical staff of the army.

Entrance to the Staff College, at Camberley, near Sandhurst, is obtained by competitive examination. The first twenty-eight officers who qualify at the annual examination are admitted, with certain limitations. These officers must all qualify at the examination, held every summer, in simple mathematics, one modern language, fortification, military topography, and tactics. A service of at least five years is also required, and candidates must be under thirty-seven years of age, be captains or have passed the qualifying examination for that rank, and have been selected by their commanding officers as fit for the staff in physical qualifications, military knowledge, conduct, habits, and temper. The college course commences in February of each year, and includes the study of modern languages, military history and geography, fortification and artillery, tactics, staff duties, military administration, topography, and law. There is an examination at the end of each year, and officers must also pass in military equitation. If successful, they leave the college at the end of the second year, and, after being attached for a month to each of those branches of the service with which they have not hitherto served, rejoin their regiments until opportunities occur for appointing them to the staff.

At the School of Gunnery, Shoeburyness, officers and men of the Royal Artillery are put through a course of gunnery and artillery exercises, and experiments with new guns, shells, fuses, armour-plates, &c. are carried out in connection with the ordnance committee; while at the Artillery College, Woolwich, officers are instructed in the manufacture of ordnance, laboratory work, chemistry, metallurgy, electricity, &c.

The School of Military Engineering, Chatham, is for the instruction of engineer officers and men in construction and estimating, practical fortification, surveying, submarine and military mining, bridging, ballooning, electricity, chemistry, photography, &c. Young officers on appointment from the Royal Military Academy remain under instruction and 'on probation' at this school for two years. For officers of other branches of the service there are classes for instruction in 'field-works' and surveying; for cavalry soldiers, a 'cavalry-pioneers'' course (hasty demolitions, obstructions, &c.); and a class for infantry pioneer-sergeants.

The School of Musketry at Hythe (q.v.) is for the other arms what the School of Gunnery is for the artillery. For the Royal Military School of Music, Kneller Hall, see BAND.

At the School of Gymnastic Instruction, Aldershot, officers qualify for the appointment of superintendent of gymnasiums, and non-commissioned officers or men for that of gymnastic-instructor. The course includes fencing with foil, sword, or bayonet. Recruits are put through a three months' course of gymnastics here and in every garrison where there is a gymnasium.

Army Schools (q.v.) are provided for the general education of soldiers and their children; and 'garrison classes' under specially qualified staff-officers, generally graduates of the Staff College, for the technical instruction of officers studying for the examinations which they must pass before promotion to the ranks of captain and major.

For the United States Military Academy, see WEST POINT. Other military schools in the United States include the Virginia Military Institute at Lexington (founded in 1839), the Kentucky Military Institute (1846) at Farmdale, and the school for subalterns of artillery at Fortress Monroe, in Virginia, for infantry and cavalry officers at Fort Leavenworth, Kansas, and for engineers at Willet's Point. Moreover, there are forty commissioned officers detailed to act as professors of military science and tactics at certain colleges which have received from the United States grants of land.—In Canada there is a Royal Military College at Kingston (1876).

Militello, a town of Sicily, 21 miles SW. of Catania. Pop. 10,505.

Militia (Lat. *miles*, 'a soldier') is the name sometimes given to the troops of the second line of a national army. Thus, an Italian or Russian soldier, after serving in the active army and its reserve, passes into the militia available as garrison troops or to form a field army. The corresponding troops in Germany and Austria are called *landwehr* and *landsturm*, and in France the *territorial army*.

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Though at first intended for home defence only, those troops are freely used to reinforce the regular army if the exigencies of the campaign require it. In several respects the militia of Great Britain differs from that of other European nations. It can only be sent out of the country if it volunteers and with the consent of parliament, and with a few individual exceptions the men composing it have never served in the regular army.

It is a constitutional force raised under the sanction of parliament for the defence of the country against invasion. Organised by counties and cities, it is essentially a local force. Under the Anglo-Saxons all men were required to bear arms as a sort of body-rent for the land they held, but there was no special organisation until Alfred's reign. That great king organised the militia or *fyrd*, making land the basis of numbers, but the family system that of discipline: so many families were a tything, ten tythings a hundred, and hundreds were united into county powers, each under its *heretoga*, dux, or duke. Each section of the community had not only to furnish its quota in time of war, but also to provide arms, keep them in repair, and train its men for so many days every year. This arrangement subsisted in more or less vigour until the Conquest; then the feudal troops rendered the militia unnecessary; but it never ceased wholly to exist, and when the crown began to contend with the Norman barons it naturally found its most powerful instrument in the Saxon militia. Henry II. established 'an assize of arms,' at which every holder of land was bound to produce one or more men fully equipped, and capable of fighting in the national defence. This annual assembly of the fyrd or militia is first recorded after the Conquest in 1181. Further alterations to suit the advances in the art of war took place in 1558. In 1604 James I. abolished the fyrd, and substituted 'Trained (commonly called Train) Bands,' to the number of 160,000 men—a force partaking of the nature of both the militia and volunteers, but deficient in discipline and drill. During the Civil War the train bands for the most part sided with the Parliament. Up to that time the command had never by any law been definitely assigned to the crown, but after the Restoration the loyal parliament of Charles II. declared 'the sole supreme government, command, and disposition of the militia to be the undoubted right of his majesty and his royal predecessors.' As, however, the crown from this time began to depend for its support upon a mercenary army, the militia was much neglected until 1757, when, a large portion of the regular army being absent in the Seven Years' War, it was carefully organised for the defence of the kingdom. Several militia acts have been subsequently passed. In 1871 the control of the militia was transferred to the War Office from the lords-lieutenant, who may, however, still recommend gentlemen for commissions. Various laws for the consolidation of the national defences by bringing the army, militia, and other military forces into closer connection were completed in 1876, and the United Kingdom was divided into 69 infantry regimental districts. To each belongs a territorial regiment, consisting generally of two line battalions, and two to nine militia battalions, besides the regimental depôt, volunteer battalions, and the men in the Army Reserve and Militia Reserve. The latter are militiamen who by taking a double bounty (£2) at the end of each training render themselves liable in time of emergency to be drafted into the regular army. The Militia Reserve numbers about 30,000.

The number of militiamen to be provided by each territorial district—known as its 'quota'—is fixed by government in proportion to the number of battalions in each such district. These numbers are raised by voluntary recruitment, serve six years, and may re-enlist for six more; but should volunteering fail, a levy by ballot would be made upon all the inhabitants of the locality between the ages of eighteen and thirty to serve five years. The power of making this ballot always exists, and would have by law to be enforced, but for the annual Militia Ballot Suspension Act. Many classes are exempt from the ballot, as peers, soldiers, volunteers, yeomanry, resident members of universities, clergymen, parish schoolmasters, articled clerks, apprentices, seafaring men, crown employés, free watermen of the Thames; in England any poor man with more than one child born in wedlock; in Scotland any man with more than two lawful children and not possessed of property to the value of £50; in Ireland any poor man not worth £10, or who does not pay £5 per annum for rent, and has more than three lawful children under the age of fourteen.

Large barracks have been built at the headquarters of regimental districts where there were none previously, so that militia when training need no longer be billeted. Camps are constantly formed for their occupation. The officers are often employed with regular troops, both infantry and artillery. Militia recruits are if possible trained at the headquarters of the regimental district, and everything possible done to increase the efficiency of the force and assimilate it to the regular army. Young officers, after serving two trainings in the militia and passing an examination in tactics, fortification, military topography, and law, as well as a literary examination similar to that for cadetships at the Royal Military College (see MILITARY SCHOOLS), are given commissions in the line and cavalry, or, if they pass the entrance examination for the Royal Military Academy at Woolwich, in the artillery. Finally, in 1890 it was decided that the militia should no longer be styled part of the 'auxiliary' forces of the empire.

The militia assembles annually for not more than fifty-six days' training (recruits for not more than six months'), and the government can embody the whole or part of the force at any national crisis. In November 1813 a brigade of three militia battalions was formed, and embarked for France in March 1814, serving in the Marquis of Dalhousie's division till the peace. By 1815 the militia had been embodied for nearly twenty years; again, during the Russian war of 1854–56 several battalions served in garrison at Gibraltar and Malta; and many were embodied during the Indian Mutiny, 1857–59. The quota of the United Kingdom (including the Channel Islands) is 143,459 men, of which number 121,000 may be considered as effective, costing the country about 1¼ millions.

A militiaman receives a bounty of £1 (£1 10s. if re-enlisted) after each training. When out for training or embodied, the officers and men receive the same pay as regular troops of corresponding arms of the service, and are then all under the Army Act of 1881. The officers rank with, but junior to, those of the regular army, and are at all times subject to military law. The only distinction in uniform is the letter M on the shoulder-strap.

The celebrated Local Militia is the old general levy; it was instituted in 1808, and suspended but not abolished in 1816. It consisted of a force for each county six times as numerous as the regular militia quota. The men were drawn by ballot from those between the ages of eighteen and thirty, served four years, and were not paid bounties or allowed to find substitutes. The counties were liable to a fine of £15 for every man short of the quota. These troops could only be marched beyond their respective counties in the event of actual invasion, but

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were liable to be called out in case of rebellion. Their numbers reached in 1811 to 213,000 men.

The militia of Scotland was not organised until 1797, though before that year corps of fencibles had been embodied. It was to be raised by ballot among men between the ages of nineteen and thirty. In 1802 it was brought under the same rules as the English militia. The Irish militia dates from 1715, when all Protestants from sixteen to sixty were bound to serve or find substitutes. Several subsequent acts of parliament altered the conditions of service, introduced the ballot, &c., and finally in 1809 it was organised in a similar manner to the English force. Besides the infantry and artillery militia there are in England four companies of engineer militia, fortress troops, in Monmouthshire, and three in Anglesey; also six divisions of submarine miners (dating from about 1884) at Portsmouth, Plymouth, Chatham, Harwich, Milford Haven, and the Severn mouth.

The Channel Islands Militia, dating from 1201, consists of four corps of garrison artillery and six battalions of infantry (in all about 4000 men), and is recruited by conscription. All youths between the ages of sixteen and eighteen are liable to drill preparatory to being enrolled in the ranks of a regiment. Each man has to serve ten complete trainings, and then passes into the reserve, in which he remains up to the age of sixty years. A sum of £6370 is voted by parliament in aid of this force.

In Canada there are artillery and infantry militia for home defence, and similar troops in all important British colonies. The Royal Malta Fencible Artillery is declared by the Army Act of 1881 to be part of the regular army, though not liable to serve out of Malta except with their own consent. For the militia of the United States, see ARMY, Vol. I. p. 437, and UNITED STATES; see also LANDWEHR, and the articles on the several countries.

Milk is an opaque white fluid secreted by the mammary glands of the females of the class Mammalia, after they have brought forth their young, and during the period in which their offspring are too immature to live upon ordinary food. It is devoid of odour, except for a short time after its extraction; is of a slightly sweet taste, most commonly of a slightly alkaline reaction (except in the Carnivora, in which it is acid); and its average specific gravity (in the case of human milk) is 1032.

When examined under the microscope milk is found to consist of numberless transparent globules, of very minute size, floating in a clear colourless fluid, the milk plasma. These globules are composed of fat, and they are each enclosed by a thin envelope of an albuminous material termed *casein*. When milk has stood for some time, the larger globules rise to the surface and form a layer of *cream*, which is therefore rich in fat and poor in other nutritive substances (presently to be described) that are found in the milk plasma. When the cream is removed *skimmed milk* remains. If this, or better still the unskimmed milk, be agitated in a churn, the envelopes which surround the fat globules are broken, the fat runs together, and we have milk fat or *butter*. The albuminous casein, which according to some encloses the fat globules, but according to other observers exists in solution in the plasma, is an albuminous substance combined with calcium phosphate. This calcium phosphate is necessary for its solution, and if its union with the albumen be interfered with, as by the addition of an acid, the casein separates out in microscopic filaments which interlace, enclosing the milk globules, and forming a more or less solid clot. If milk be allowed to remain in an open vessel and in warm weather, a few hours will produce this result; the casein clots in little masses, and we say 'the milk has turned.' It is acid or sour to the taste, and contains micro-organisms (*bacterium lacticum*), by whose agency these changes are brought about. These little microbes have the power of converting the milk sugar into lactic acid, which in its turn coagulates the casein. These microbes do not exist in milk freshly passed from the mammary glands; they must find their way into the milk, where they rapidly multiply; and, as their germs are very freely distributed, this occurs sooner or later. The dairy-keeper, by efficient ventilation and scrupulous cleanliness, endeavours to keep his dairy and his milk as free from these organisms as possible, and the careful nurse scalds out the infant's bottle in order that they may not multiply, as they will readily do, in any stale milk, rapidly infecting the fresh milk each time the bottle is used. The casein is not only clotted by acids, but a secretion of the stomach called rennet has a similar action. A teaspoonful of a commercial infusion of rennet will cause half a pint of milk, at a summer temperature, to form a beautiful white clot, which subsequently contracts, expressing the *whey*. This occurs in the stomach when we drink milk, and this is one reason why milk may disagree: in order to render it more digestible it may be 'sipped' or it may be taken with lime-water, for in this way the formation of large clots within the stomach may be avoided. The curds which form after the addition of rennet can be made into *cheese*. In cheese, therefore, we have a rich supply of nitrogenous matter (casein) together with fatty matter derived from the milk globules held fast in the curd.

Milk contains a sugar—milk sugar—in solution, and in addition a rather large proportion of inorganic salts. It contains all that a child requires for the growth and nourishment of its body, and is manufactured at great expenditure of the mother's strength. The first milk that flows from the breast at the beginning of a lactation period is termed the *colostrum*, and is rich in fat but poor in casein. After a few days, during which time the child feeds chiefly on its own tissues and loses weight, the secretion becomes thoroughly established. In a healthy, well-fed woman this continues for some months, after which time the drain upon the energy of the mother's body renders the milk poorer and less nutritious. The milk contains the salts, chiefly of lime, from which the infant builds its skeleton. Where the children are ill nourished and rickety, doctors often recommend the dilution of the milk with lime-water, ignorant of the fact that milk contains a considerably larger quantity of lime than the lime-water itself. The lime-water diminishes acidity, and renders the milk digestible, but hardly adds lime; rickets is generally due not to lack of lime-salts in the food, but to want in the child's system of the power to assimilate them. It is well known that many medicines taken by the mother are excreted in the milk, and this point must be borne in mind by mothers suckling their infants; much nonsense is, however, believed in regarding the fatal and sudden injury done to children as a result of severe mental excitement on the part of the wet-nurse. Owing to inability of the mother either to nourish her offspring herself or to provide it with a wet-nurse, it may be necessary to bring it up on the milk of an animal; see INFANT (FEEDING OF), BREASTS.

The following table, which is based on researches of Vernois and Becquerel, show the density and composition of 1000 parts of milk:

	Density.	Water.	Solids.	Extractives.	Sugar.	Fat.	Salts.
Woman	1032·67	889·08	110·92	39·24	43·64	26·66	1·38
Cow	1033·38	864·06	135·94	55·19	38·03	36·12	6·64
Mare	1033·74	904·30	95·70	33·35	32·76	24·36	5·23
Ass	1034·57	890·12	109·88	35·65	50·46	18·53	5·24
Goat	1033·53	844·90	155·10	35·14	36·91	56·87	6·18
Ewe	1040·98	832·32	167·68	69·78	39·43	51·31	7·16
Bitch	1041·62	772·08	227·92	116·88	15·29	87·95	7·80

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It is preferable to use the milk of *one* animal and not the mixed milk of a dairy, as in that way we minimise the chances of infection. It should be diluted with about one-third of water, and perhaps a pinch of sugar added. It then forms a good substitute for the mother's milk. But disease is very frequently transmitted by milk, not only from using contaminated water for washing the milk cans and for adulterating it, but also from the cow itself (see TYPHOID FEVER, SCARLATINA). It is not improbable that many obscure tubercular conditions are thus acquired by children.

Condensed milk is generally prepared from that of the cow, sweetened by the addition of ordinary cane sugar, and evaporated to about ⅛th of its bulk. While hot it is poured into tins and sealed up. When used for food the milk may be diluted with six or seven times its volume of water, but in the case of infants the dilution must be more liberal. During the first month it may be diluted with twelve or fourteen volumes, and later on with ten volumes of water. It is often found to agree with children better than cow's milk, but it is a fatal mistake to rear an infant on condensed milk entirely, as the diet will suffer from too great uniformity. It is a safe rule when a child has to be brought up on animal milk, and when the household milk does not agree, to change the dairy. If this does not succeed, the ordinary cow's milk may be tried, say for the morning or afternoon feeding, with condensed milk at night. In all cases it is better to err in freely diluting milk, for nothing is so apt to disagree with a child as a surfeit of rich milk; dilution will do no particular harm.

Milk is frequently adulterated, chiefly with water (see ADULTERATION). In this case a given volume of milk will contain an abnormally small number of milk globules. As these milk globules are the cause of the opacity of milk, a thin layer of the adulterated milk will be less opaque than a similar layer of unadulterated milk. Many forms of lactoscopes have been invented for testing the opacity and consequent dilution of milk (see LACTOMETER). Unskimmed milk should yield in standing 12 to 24 parts per cent. of cream, and its specific gravity should be 1·028 to 1·034. Skimmed milk is heavier—1·032 to 1·040 (see also DAIRY).—Milk-weed is a local name for the genus Asclepias; for Milk-tree, see COW-TREE.

Milk-fever. The establishment of the secretion of milk about two days after delivery is occasionally the cause of considerable constitutional disturbance, with all the symptoms of the feverish state. This occurs especially when the infant is not applied soon enough to the breast, and especially when the mother is kept on too low a diet; a fact which probably explains the much greater frequency of the condition in former times, when such treatment was considered necessary. The disturbance of health is not serious, and passes off when the breasts are emptied.

In the lower animals, also, milk-fever comes on within a few days after parturition. One variety, common to most animals, consists in inflammation of the membranes of the womb and bowels, and is produced by exposure to cold, overdriving, or injury during labour; it is best treated with oil and laudanum, tincture of aconite, fomentations to the belly, and antiseptics such as carbolic acid (largely diluted) injected into the womb itself. The other variety, to which alone the term 'milk-fever' should be applied, is almost peculiar to the cow. It attacks animals in high condition, that are good milkers, and have already borne several calves, and consists in congestion of the brain and large nervous centres, and impairs all the vital functions, leading to dullness, loss of sensation, stupor, and complete unconsciousness. Blood must be drawn early, whilst the cow is still standing and sensible; later it only hastens death. A large dose of physic, such as a pound each of salts and treacle, a drachm of calomel, an ounce of gamboge, and two ounces of ginger, should at once be given, solid food withheld, clysters of soap, salt, and water thrown up every hour, cloths wrung out of hot water applied along the spine, the teats drawn several times daily, and the animal frequently turned. Although treatment is uncertain, prevention may be ensured by milking the cow regularly for ten days before calving, feeding sparingly on laxative, unstimulating food, giving several doses of physic before and one immediately after calving, and, when the animal is in very high condition and prone to milk-fever, bleeding her a day or two before calving.

Milkworts (so called from the milky juice) are various species of plants belonging to the natural order Polygaleæ or Polygalaceæ. The order comprises about 20 genera and 500 species which are widely distributed over the tropical and subtropical parts of the world; several species are natives of North America and of Europe. They are herbaceous plants or shrubby, occasionally in the latter case being of climbing habit. The leaves are usually simple and destitute of stipules; the flowers are irregular. Their qualities are generally tonic and slightly acrid; and some, as Krameria, are very astringent.—The Common Milkwort (*Polygala vulgaris*) is a small perennial plant, growing in dry hilly pastures, with an ascending stem, linear-lanceolate leaves, and a terminal raceme of small but very beautiful flowers, having a finely-crested keel. It varies considerably in size, in the size and even shape of the leaves, and in the size and colour of the flowers, which are sometimes of a most brilliant blue, sometimes purple, pink, or white.—*P. Senega* is a North American species, with erect simple tufted stems, about one foot high, and terminal racemes of small white flowers. The root, which is woody, branched, contorted, and about half an inch in diameter, is the Senega Root, Seneka Root, or Snake Root of the United States, famous as an imaginary cure for snake-bites, but really possessing important medicinal virtues—stimulating, diuretic, diaphoretic, emmenagogue, and in large doses emetic and purgative—employed in catarrhs, pulmonary affections, rheumatisms, low fevers, &c. Its chief active principle is Polygalic Acid, $C_{32}H_{18}O_{11}$. The root of *P. Senega* has been employed as a cure for snake-bites by the American Indians from time immemorial, and it is a curious fact that *P. crotalarioides* is employed in the same way in the Himalayas. *P. vulgaris* is tonic, stimulant, and diaphoretic; and *P. amara*, a very similar European species, possesses the same properties in a

Common Milkwort (*Polygala vulgaris*).

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higher degree, as does *P. rubella*, a small North American species. The root of *P. poaya*, a Brazilian species, with leathery leaves, is an active emetic, and in a fresh state is employed in bilious fevers. *P. tinctoria*, a native of Arabia, furnishes a blue dye like indigo. *P. venensoa* is by the natives of Java dreaded on account of its noxious heavy odour, which they say causes severe headache and violent sneezing. Another medicinal plant of the order is Rattany (q.v.) Root. The bark of the roots of *Monnina polystachia* and *M. salicifolia* is used in Peru as a substitute for soap; and *Mundia spinosa*, a South African shrub, produces an eatable fruit.

Milky-way. See GALAXY.

Mill. This word is now used in a general way as a name for almost all kinds of manufactories, as well as for machines used for grinding; but in this article we shall describe only a flour-mill. For other mills, see SPINNING, WEAVING, COTTON, FLAX, WOOL, &c.

From time immemorial, until quite recent times, wheat has always been ground between two stones. At first hand-mills were used such as are so often mentioned in the Bible, and are still met with amongst uncivilised peoples (see QUERN); but the mill subsequently passed through many mechanical developments up to the large merchant mills now found in every civilised country, some of which recently contained upwards of 100 pairs of large millstones. These were made of 'buhr,' a very hard silicate, the best stones coming from the valley of the Seine. The millstones were circular, usually about four feet in diameter, formed of wedge-shaped pieces strongly cemented together, and bound by iron hoops. The surfaces were cut into a series of radiating ridges and furrows, by which means the wheat was pushed from the centre to the circumference of the stones, as well as broken between the edges of the ridges. Great care had to be taken that the surfaces of the two stones were perfectly level and perfectly parallel to each other. Only the upper stone or 'runner' revolved, the lower or 'bedstone' being fixed. The first successful steam flour-mill was erected in London in 1784.

Iron rollers in place of millstones were first practically tried at the roller mill in Pest, founded in 1840 by the patriot Count Szechenyi. This new system, called 'the high grinding or gradual reduction roller system,' ultimately spread throughout Hungary, and made Budapesth for many years the greatest flour-milling centre in the world. By 1875 this system had been adopted by the millers of the north-western states of America, and has enabled them to outstrip their teachers: Minneapolis is now the largest flour-milling centre in the world, and its mills send a great quantity of flour to England. Since 1880 this system has been universally adopted by large mills, and is being gradually introduced into small mills also. The great advantage of rollers over millstones is found to be that the former avoid the rasping of the outside of the wheat berry which was inseparable from millstones, and produced a small quantity of very dark powder which necessarily mixed with the flour and greatly deteriorated its colour.

The following is a description of the different processes which together form the 'high-grinding' or 'gradual reduction' system of flour-milling. (1) The wheat is cleaned or 'smutted,' as it is termed, by means of sifting, winnowing, and being put through a cylinder of wire-cloth, with rapidly revolving arms inside, which combines the actions of sifting and polishing the wheat. A machine furnished with hard brushes is often employed to scrub the wheat. (2) The cleaned wheat is sent to grooved chilled-iron rollers (see fig. 1), and slightly broken between them; the product is sifted by means of cylinders covered with wire-cloth or silk-gauze, by which means a proportion of flour is separated, mixed with a substance composed of small pieces of the floury part of the wheat berry, and called usually 'middlings,' sometimes 'semolina.' The pieces of broken wheat are sent to other rollers to be again broken, and the product sifted as before. This process is repeated from four to seven times, according to the ideas of the miller and the nature of the wheat, until, as far as possible, all the floury part has been scraped from the husk or 'bran,' which is sold for fodder.

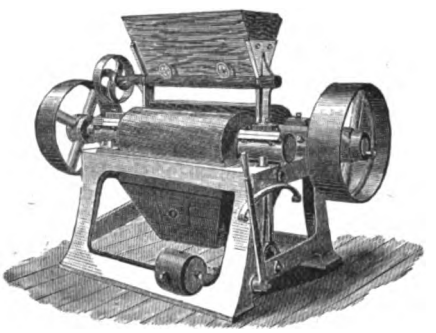

Fig. 1.—Roller Mill.

We are thus left with the mixture of flour and 'middlings' from the four to seven breaking processes. The products from the different breaking processes are generally mixed together and then sifted as before described, in order to separate the flour which is then ready for use from the 'middlings,' which are then put through the process called 'purification.' It may here be mentioned that the making of a large quantity of 'middlings' is the principal difference between the former 'low-grinding' and the present 'high-grinding' system, and is the chief advantage of the latter. By the former process it was sought to reduce the wheat at one grinding as far as possible into flour and bran: it was, however, found to be impossible to keep the two separate, a portion of finely-powdered bran being inevitably mixed with the flour, greatly to the detriment of the latter. By high-grinding, the floury part is reduced in the first instance principally to a granular state, and, though bran particles are mixed with the flour granules, they may be almost entirely separated, owing to the difference in their specific gravity, by means of this process of purification. (3) The size of the granules of the middlings varies from that of fine sand to that of a pin's head. The middlings are therefore first separated by sifting into as many sizes as may be thought desirable, and each size is sent to one or more machines called 'middlings' purifiers.' These are of two types, called 'gravity' and 'sieve' purifiers. In the first type, which is generally used for the large sizes of middlings, the material is directly acted on by a draught of air. The machine usually takes the form of a series of sloping boards, or of revolving discs, by either of which devices the middlings are caused to fall repeatedly in a thin even stream through a current of air produced by a revolving fan. As the specific gravity of the flour granules is greater than that of the bran particles, it is obvious that the current of air may be so regulated as to carry away the particles of bran, leaving the flour granules to fall to the bottom of the machine.

The sieve purifier generally takes the form of an oblong box, or case, of wood; occupying the centre

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plane of this case a sieve formed of silk-gauze is suspended by springs from the top of the case, and is made to oscillate by means of a crank. A revolving fan is placed at the top of the machine, which draws air through the meshes of the sieve, the current of air being so regulated that the branny particles are either carried away by the draught to a suitable receptacle, or are kept suspended on the top of the sieve until they are carried over the end of it, while the heavier flour granules fall through the sieve. This type of machine is always used for the smaller sizes of middlings. It is the dust drawn from these machines by the fans that, when mixed in a certain proportion with air and accidentally ignited, has caused several very serious explosions in flour-mills. In consequence of this, whereas it was formerly usual to send this dust-laden air to a large chamber where the dust was allowed to settle by its own weight, and where the explosions generally occurred, within recent years many ingenious contrivances called 'dust collectors' have been invented for separating the dust in small quantities, and thus minimising the danger. These are now generally used. The middlings, after being thoroughly cleaned (by repetition of the process when necessary), are ground between smooth chilled-iron rollers and the product sifted; the flour thus produced is of fine quality, and is usually called 'patent' flour. Millstones may still be profitably employed to grind the finest sizes of middlings, but this is the only use to which they are put in a modern mill.

Fig. 2 represents one type of cylinder used for sifting (technically, 'dressing') the products in flour manufacture, to which we have several times had to refer. These cylinders are of two kinds,

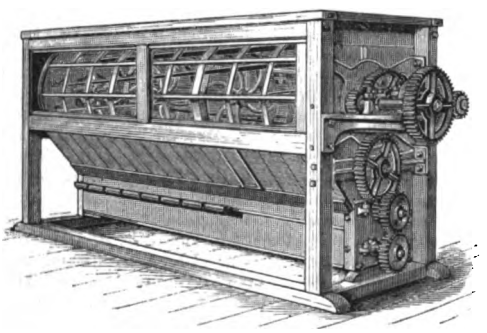

Fig. 2.– Centrifugal Dressing Reel.

the ordinary 'reel' or cylinder being a framework covered round with wire-cloth or silk-gauze, and made to rotate, thus setting in motion the enclosed material. The other type is called a 'centrifugal dressing' machine (see fig. 2). In this machine, in addition to the rotating cylinder, there is a frame with long pieces of wood or iron attached, made to revolve independently inside the cylinder. By this means the material is thrown against the circumference of the cylinder, so that a much smaller surface is required than in the ordinary reel to do the same amount of work. The 'Plansichter,' introduced in Budapesth in 1888, which, as its name implies, is a horizontal sieve, has a special contrivance for keeping the material in motion, and the meshes clear. This machine has made considerable progress in Hungary, but it is as yet too early to predict that it will supersede the cylindrical 'dressing' machines. Almost all modern mills are constructed on what is termed the automatic system, which means that all the conveyance of the material from one point in the mill to another is done by mechanical means; so that of the great bulk of the flour it may be said that it is never stopped or touched on its journey from the time it leaves the wheat sack until it reaches the flour sack. The conveyer generally used to move material in a horizontal direction is a helical screw (sometimes called an Archimedean screw); and to lift to a higher level an Elevator (q.v.) is used.

See Fairbairn, *Treatise on Mills and Mill-work* (1878); Kick, *Flour-manufacture* (2d ed. 1878; Eng. trans. by Powles); Voller, *Modern Flour Milling* (1889).

Mill (Lat. *mille*, 'a thousand'), in the United States, is the tenth part of a cent, the thousandth part of a dollar. As a coin it has no existence.

Mill, JAMES, was the son of a shoemaker, and was born in Logie-Pert parish, near Montrose, Scotland, 6th April 1773. He studied, with a view to the church, at the university of Edinburgh, where he distinguished himself in Greek and in Moral and Metaphysical Philosophy. He was licensed to preach in 1798; but instead of following out the ministry, he went to London in 1802, where he settled as a literary man. He became editor of the *Literary Journal*, which after a time was discontinued; and wrote for various periodicals, including the *Eclectic* and the *Edinburgh Review*. In 1806 he commenced his *History of British India*, which he carried on along with other literary work, and published in the winter of 1817–18. The impression produced by this masterly history on the Indian authorities was such, that, in 1819, the Court of Directors of the Company appointed him to the high post of Assistant-examiner of Indian Correspondence, notwithstanding the then unpopularity of his well-known radical opinions. The business assigned to his care was the revenue department, which he continued to superintend till four years before his death, when he was appointed head of the examiner's office, where he had the control of all the departments of Indian administration—political, judicial, and financial—managed by the Secret Committee of the Court of Directors. Shortly after his appointment to the India House, he contributed the articles on Government, Education, Jurisprudence, Law of Nations, Liberty of the Press, Colonies, and Prison Discipline to the *Encyclopædia Britannica*. These essays were reprinted in a separate form, and became widely known. The powers of analysis, of clear statement, and of the thorough-going application of principles, exhibited in these articles, had probably never before been brought to bear on that class of subjects. In 1821–22 he published his *Elements of Political Economy*, a work prepared primarily with a view to the education of his eldest son, John Stuart Mill. In 1829 his *Analysis of the Human Mind* appeared. His last published book was the *Fragment on Mackintosh*, brought out in 1835. He was also a contributor to the *Westminster Review* and to the *London Review*, which merged in the *London and Westminster*.

Not long after he settled in London, he made the acquaintance of Jeremy Bentham, and for a number of years lived during the summer in Bentham's country-house. Although he must have derived much benefit from his intercourse with the great law-reformer, he was not a mere disciple of Bentham, but a man of profound and original thought, as well as of great reading, in all the departments of moral, mental, and political philosophy. His conversation was impressive to a remarkable degree, and he gave a powerful intellectual stimulus to a number of young men, some of whom (including his own son, and Grote, the historian of Greece) have since risen to eminence. He took a leading part in the founding of University College, London. He died at Kensington, 23d June 1836.

See the Autobiography of J. S. Mill; and Professor Bain's *James Mill* (1882).

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Mill, JOHN STUART, the eldest son of James Mill, was born in London on 20th May 1806. He was educated by his father, by whom he was subjected from his earliest years to a careful and systematic training, which was to fit him to carry on the work and champion the opinions with which the elder Mill was identified. Almost from infancy his intellect was on the strain. He is said to have begun Greek at the age of three, and before he was fourteen he had read extensively in Greek, Latin, mathematics, and English, had begun logic and political economy, and already possessed the intellectual acquirements of a well-educated man. But he was secluded from companions of his own age. As he himself says, he 'never was a boy.' His nearest approach to recreation was the long walks—in reality peripatetic oral examinations—for which he was regularly taken by his father. In 1820 he went to France on a visit to the family of Sir S. Bentham (Jeremy Bentham's brother), and was thus removed for more than a year from his father's immediate influence. His studies were never intermitted. His residence in France not only gave him a keen interest in French politics and social conditions, but stimulated his botanical enthusiasm, and the love for scenery and travel, which became the chief relaxations of his arduous life. After his return home he worked at history and law, and read the English and French philosophers. His first published writings appeared in the *Traveller* newspaper in 1822. In the following year a career was secured for him by an appointment under his father at the India Office, from which he retired as head of his department in 1858, on the transfer of the Company's government to the crown. At the same time he declined a seat in the new India Council offered to him by Lord Derby. During the years 1823–26 he was a member of a small Utilitarian society which met for the purpose of discussion at Jeremy Bentham's house. The name 'Utilitarian' was suggested by an expression in one of Galt's novels, and seized upon by him 'with a boy's fondness for a name and a banner,' to describe himself and others of like opinions. In the Speculative Society, which was founded in 1825, and of which he remained a member till 1829, he met men of a greater variety of creeds, and formed an intimate friendship with Maurice and Sterling, Liberals of a different type from those he had met at his father's house, and influenced by Coleridge, not by Bentham.

Before he was twenty, Mill was recognised as the champion and future leader of what may be called the Utilitarian School in philosophy and politics, and had become the most frequent contributor to the newly-established organ of the party, the *Westminster Review*. But the 'mental crisis' through which he passed at this time (1826–27) led to a modification of his attitude. Bentham's *Treatise on Legislation*, which he had read four or five years before, formed the keystone of his previous position. It gave him 'a creed, a doctrine, a philosophy; in one among the best senses of the word, a religion; the inculcation and diffusion of which could be made the principal outward purpose of a life.' The crisis under which his enthusiasm for his old creed and opinions broke down was attributed by himself not merely to a dull state of nerves, but to the purely intellectual education which weakened his sympathies at the same time as it taught him to analyse and trace them to their origin. He ultimately emerged from the state of depression by discovering that feeling was not dead within him. The experiences of this period left, he tells us, two very marked effects on his opinions and character. In the first place, they led him to a new theory of life in relation to happiness. The conviction was forced upon him that happiness—although the test of all rules of conduct and the end of life—was only to be obtained by not making it the direct end, but by having one's mind fixed on some such ideal end as the improvement of mankind, or even some art or pursuit. His 'mental crisis' further led him to see the necessity for human well-being of the internal culture of the individual. He ceased to attach almost exclusive importance to the ordering of outward circumstances, and to the forced training of the human being for thought and action. And soon after this time he found in Wordsworth's poems 'the very culture of the feelings' he was in quest of.

The wider appreciation of speculation and literature brought about by this new attitude may be seen in his reviews of Tennyson's poems (1835), and of Carlyle's *French Revolution* (1837), as well as in his article on Coleridge (1840). His article on Bentham (1838) made clear the extent of his divergence from his inherited creed, and gave rise to the 'admiration mixed with fear' with which Grote and others of the school regarded him. In this article can be traced the lines along which, in his subsequent writings, he modified the traditional creed of Bentham and James Mill. Perhaps the reaction from Benthamism would have gone further had it not been for the friendship with Mrs John Taylor (whom he first met in 1830, and whom he married in 1851), which formed the romance of his life. It is indeed hardly possible to estimate her influence so highly as Mill did himself. All his leading opinions were formed before he made her acquaintance, and some of his most important works were completed without her assistance. But she did exert great influence on the expression of his views, and apparently had a steadying effect on his philosophical position.

Mill never forsook, though he modified, the leading principles of the philosophy in which he was educated. He held that knowledge could be analysed into impressions of sense, and that the principle of association was the great constructive force which combined these sensations and their copies, or ideas, into systems of thought, modes of feeling, and habits of acting. His *System of Logic* (1843)—perhaps the most original and important of his works—traces, and gives a rationale of, the way in which the real, disjointedly given in sensation, is combined into scientific knowledge. Its treatment of the methods of inductive science—in which it owes much to Herschel, Whewell, and Comte—has become classical. His *Examination of Sir W. Hamilton's Philosophy* (1865), and edition of James Mill's *Analysis of the Phenomena of the Human Mind* (1869), contain a polemical defence and exposition of the association-psychology, notable for their clear recognition of the mental elements which that psychology assumes without explanation. His essay on *Utilitarianism* (1861) defends the greatest-happiness theory, but suggests modifications inconsistent with it (see ETHICS, p. 435 *b.*). He held that government was to be purified and made into a utilitarian instrument by means of representative institutions; but he had less confidence than Bentham and his father had in the effect of reason and argument upon men, disapproved of an equal suffrage, distrusted the ballot, and argued eloquently for individual liberty of thought and action against the tyranny of the majority (*Considerations on Representative Government*, 1861; *Thoughts on Parliamentary Reform*, 1859; *On Liberty*, 1859). His *Principles of Political Economy* (1848) is a systematic treatise, which does not depart in its main teaching from the theory laid down in abstract fashion by Ricardo; but it recognises more clearly the hypothetical character of this theory, and it discusses the social applications of economic doctrines. Mill was M.P.

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for Westminster from 1865 to 1868. In parliament he voted with the advanced Radical party; and his advocacy of women's suffrage in the debates on the Reform Bill of 1867 led to an active movement for placing the legal and political rights of women on an equality with those of men. Mill died at Avignon, 8th May 1873, and was buried in the cemetery there.

In addition to the works already mentioned, Mill was the author of *Essays on some unsettled Questions of Political Economy* (1844), *Auguste Comte and Positivism* (1865), *England and Ireland* (1868), *Subjection of Women* (1869). After his death were published *Autobiography* (1873), and *Three Essays on Religion* (1874). His more important occasional writings are collected in four volumes of *Dissertations and Discussions* (1859-75). For his life and opinions, see the biographies by A. Bain (1882) and W. L. Courtney (1889).

Mill, JOHN, a New Testament critic, was born about 1645, at Shap in Westmorland, entered Queen's College, Oxford, as servitor in 1661, and was successively fellow and tutor of his college, rector of Blechingdon in Oxfordshire (1681), principal of St Edmund's Hall (1685), and prebendary of Canterbury (1704). He died 23d June 1707, just fourteen days after the publication of his great *Novum Testamentum Græcum*, with its thirty thousand various readings, the labour of thirty years.

Millais, SIR JOHN EVERETT, R.A., painter, was born at Southampton, 8th June 1829, the descendant of an ancient Jersey family. In the winter of 1838-39 Millais began to attend the drawing academy of Henry Sass, passing, two years later, into the schools of the Royal Academy. At the age of seventeen he exhibited at the Royal Academy his 'Pizarro seizing the Inca of Peru,' ranked by competent critics of the day as on a level with the best historical subjects then shown. Till now his work had been upon the lines of art generally current in England at the time; but there followed a phase of revolt from accepted standards, a period of search for new paths. He became associated with the knot of young artists known as the Pre-Raphaelite Brotherhood, of whom the other chiefs were Dante Gabriel Rossetti and Holman Hunt; and undoubtedly he was markedly influenced by the powerful personalities of both of these men, and by Mr Ruskin their literary ally. From them, in particular, his art received an impetus towards imagination and symbolism, which—as has been proved by the curious absence of such qualities from his later and more independent productions—were to a great extent foreign to his native genius. His marvellous technical skill enabled him to embody in visible artistic form conceptions that were essentially those of others with far greater adequacy than their own less trained hands could possibly have done. His first Pre-Raphaelite picture, a scene from the *Isabella* of Keats, strongly recalling the manner of the early Flemish and Italian masters, figured in the Academy in 1849, where it was followed in 1850 by the striking 'Christ in the House of his Parents,' known as 'The Carpenter's Shop,' in 1851 by 'The Woodman's Daughter,' in 1852 by 'The Huguenot' and 'Ophelia,' and in 1853 by 'The Order of Release' and 'The Proscribed Royalist.'

In 1856 he was elected an Associate of the Royal Academy, and soon afterwards he exhibited three of the richest and most poetic of the productions of his Pre-Raphaelite period—the 'Autumn Leaves' in 1856, the 'Sir Isumbras at the Ford' in 1857, and 'The Vale of Rest' in 1859. In the finer of the works which followed, such as 'Charlie is my Darling' (1864)—the year in which the painter received full academic honours—'The Minuet' (1866), and 'Rosalind and Celia' (1868), the precision and clear definition of Pre-Raphaelite methods still survive; but in the exquisite 'Gambler's Wife' (1869) there became visible a larger and freer method of handling, which is yet more fully established in 'The Boyhood of Raleigh' (1870), a picture which, retaining a measure of the imaginative charm of his earlier subjects, marks the transition of his art into its final and, technically, most masterly phase, displaying all the brilliant and effective colouring, the effortless power of brush-work, and the delicacy of flesh-painting, in which, when the artist is at his best, he is without a modern rival. The interest and value of his later works lie mainly in their splendid technical qualities. In great part they are actual or fancy portraits, varied by a few important landscapes, of which the first, and in many ways the finest, is 'Chill October' (1871), and by such an occasional figure-piece as 'The North-west Passage' (1873) and 'Effie Deans' (1877). Millais has executed a few etchings, and his innumerable illustrations, dating from about 1857 to 1864, and most of them published in *Good Words*, *Once a Week*, and the *Cornhill Magazine*, place him in the very first rank of woodcut designers. He is a D.C.L. of Oxford; in 1885 he was created a Baronet. A collection of nearly twenty of his works was brought together by the Fine Arts Society, London, in 1881, and 159 examples of his art formed the Winter Exhibition of the Grosvenor Gallery in 1886. See Ruskin's Notes on that exhibition, and the *Life and Work of Leighton, Millais*, &c. (1890).

Millau, a town in the French department of Aveyron, on the right bank of the Tarn, 52 miles NW. of Montpellier. During the 16th and 17th centuries it was one of the strongholds of the Calvinists. Leather and gloves are manufactured, and in wool there is a good trade. Pop. (1872) 13,879; (1886) 14,705.

Millbank Prison, or *The Penitentiary*, demolished in 1891, was situated in the parish of St John's, Westminster, facing the Thames. It was erected at an enormous cost to carry out the plans of the philanthropists Howard and Bentham; the latter's contract with the Treasury was signed in 1794, but the building was not actually commenced till 1812, and not completed till 1821. It had accommodation for 1100 prisoners, and was so constructed that, from a room in the centre, the governor was able to view every one of the cells, in which solitary confinement was rigidly enforced. Convicts condemned to penal servitude used to undergo first a term of solitary confinement in Millbank; but the prison ceased to be a convict establishment in May 1886, and was finally closed in November 1890. See Griffiths, *Memorials of Millbank* (2d ed. 1884).

Millboard is the name given to 'board' made of paper material, and varying in thickness from $\frac{1}{16}$th to $\frac{1}{4}$th of an inch. It is of a gray colour, as the various kinds of waste substances—viz. old ropes, old sacking, scraps of paper and of cardboard—from which it is usually made are not bleached either separately or when mixed and reduced to a pulp, as in the manufacture of white paper (see PAPER). The best millboard, such as that employed for binding ledgers, is made on moulds by hand; but by far the larger quantity of millboard put on the market is machine made. In the machine commonly used a revolving wire-cloth cylinder dips into a cistern containing the pulp, and takes on a layer of it about the thickness of stout brown paper. This pulpy layer is by pressure taken continuously off the wire cylinder by a felt blanket passing over a wood roller. The felt carries the single layer, in the wet state, to a pair of rollers 7 feet away from the wire cylinder. Here the layer is wound upon

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the upper or wooden roller till the required thickness is made up. The lower or iron roller presses by means of a lever and weights against the upper one with sufficient force to consolidate the layers of pulp. The hollow cylinder of millboard on the wood roller is then cut longitudinally with a knife, and opened out into a flat sheet. It is afterwards dried by steam heat or otherwise, calendered by chilled iron rolls, and cut to size by strong circular cutters.

Millboard is used for bookbinding and for making boxes, but has been largely superseded by Strawboard (q.v.). It is still employed for jointing flanged pipes and other engineering work; but for this purpose asbestos millboard (see ASBESTOS) is now preferred. Millboard or thick cardboard made from straw or wood is used for many miscellaneous purposes. Mounting board consists of several layers of paper pasted together. A few years ago a mill on a large scale was in operation near London for the manufacture of millboard from stable manure, but the process was not a success commercially.

Millbury, Massachusetts, on the Blackstone River, is 39 miles by rail W. of Boston, and has several cotton and woollen factories. Pop. 4555.

Milledgeville, the former capital of Georgia (q.v.), 32 miles ENE. of Macon. Pop. 3800.

Millenary Petition. See HAMPTON COURT.

Millennium (Lat., 'a thousand years'), a long indefinite space during which the kingdom of the Messiah will, according to the belief of many Christians, be visibly established on the earth. The idea originated proximately in the Messianic expectations of the Jews; and the Christians' belief in the *Parousia*, or Second Coming of Christ, was developed by the oppression and persecutions to which they were long subjected. The chief basis of the millenarian idea, in Judaism as well as in Christianity, is the ardent hope for a visible divine rule upon earth, and the identification of the church with that of which it is merely a symbol. In the 1st century of the church, chiliasm (the Greek equivalent of millenarianism, from *chilioi*, 'a thousand') was a widespread belief, to which the books of Daniel and the Apocalypse (chaps. xx. and xxi.) gave authority; while various prophetical writings, composed at the end of the 1st and the beginning of the 2d century—such as the *Testament of the Twelve Patriarchs*, the *Christian Sibylline Books*, the *Epistle of Barnabas*—lent it a more vivid colouring and imagery. Not only the heretic Cerinthus, but even orthodox doctors—such as Papias of Hierapolis, Irenæus, and Justin Martyr—delighted themselves with dreams of the glory and magnificence of the millennial kingdom. The *Sibylline Books*, for instance, hold that the earth will be cultivated throughout its length and breadth, that there will be no more seas, no more winters, no more nights; everlasting wells will run honey, milk, and wine. Papias indulges in monstrous representations of the rebuilding of Jerusalem, and of the colossal vine and grapes of the millennial reign.

According to the general opinion, which was as much Christian as Jewish, the millennium was to be preceded by great calamities. The personification of evil appeared in *Antichrist* (q.v.), the precursor of Christ (identified during the 1st century with Nero), who would provoke a frightful war in the land of Magog (Ezek. xxxviii. and xxxix.) against the people Gog, after which the Messiah would appear, heralded by Elias, or Moses, or Melchizedek, or Isaiah, or Jeremiah, and would bind Satan for a thousand years, annihilate the godless heathen, or make them slaves of the believers, and overturn the Roman empire. From its ruins a new order of things would spring forth, in which the 'dead in Christ' would arise, and along with the surviving saints enjoy an incomparable felicity in the city of the 'New Jerusalem,' which was expected to descend literally from heaven. With the innocence which was the state of man in Paradise there was associated, in the prevalent notions of the millennium, great physical and intellectual pleasures.

The lapse of time, chilling the ardour of the primitive Christian belief in the nearness of the *Parousia*, had without doubt also the tendency to give a more shadowy, and therefore a more spiritual aspect to the kingdom over which the expected Messiah was to reign. The influence of the Alexandrian philosophy contributed to produce the same result. Origen, for example, started the idea that, instead of a final and desperate conflict between Paganism and Christianity, the real progress and victory of Christianity would consist in the gradual spread of the truth throughout the world, and in the voluntary homage paid to it by all secular powers. Yet even in the Egypto-Alexandrian Church millenarianism, in its most literal form, was widely diffused. The Montanists (q.v.) generally were extreme millenarians or chiliasts, and, being considered a heretical sect, contributed largely to bring chiliasm into discredit, or, at all events, their own carnal form of chiliasm, which Tertullian himself attacked. Lactantius, in the beginning of the 4th century, was the last important Church Father who indulged in chiliastic dreams. In the 5th century, St Jerome and St Augustine expressly combated certain fanatics who still hoped for the advent of a millennial kingdom whose pleasures included those of the flesh. From this time the Church formally rejected millenarianism in its sensuous 'visible form,' although the doctrine every now and then made its reappearance, especially as a general popular belief, in the most sudden and obstinate manner. Thus, the expectation of the *Last Day* in the year 1000 A.D. reinvested the doctrine with a transitory importance.

At the period of the Reformation, millenarianism once more experienced a partial revival, because it was not a difficult matter to apply some of its symbolism to the papacy: the pope, for example, was Antichrist. Yet the doctrine was not adopted by the great body of the Reformers, but by some fanatical sects, such as the Anabaptists, as also by various theosophists in the next century. During the civil and religious wars in France and England it was also prominent; the Fifth Monarchy Men (q.v.) of Cromwell's time were millenarians of the most exaggerated type. The extravagances of the French Mystics and Quietists culminated in chiliastic views. During the Thirty Years' War enthusiastic and learned chiliasts flourished. Among the foremost chiliastic teachers of modern centuries are to be mentioned Ezechiel Meth and Bishop Comenius in Germany; Professor Jurieu of Sedan, and Poiret; Serarius in Holland; and in England Joseph Mede (*Clav. Apocal.* 1627), while Thomas Burnet and William Whiston endeavoured to give chiliasm a geological foundation. Most of the chief divines of the Westminster Assembly were millenarians; so were Sir Isaac Newton and Bishop Horsley. Bengel revived an earnest interest in the subject among orthodox Protestants. Spener and Joachim Lange held chiliastic views; and Swedenborg employed apocalyptic images to set forth the transfigured world of the senses. Bengel's millenarianism was adopted by the Swabian theosophist Oetinger (died 1782), and widely spread throughout Germany by Jung Stilling, Lavater, and Hess. Charles Wesley and Toplady were millenarians.

Modern millenarians or pre-millennialists (as

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believing in the pre-millennial advent of Christ) differ in many minor points from one another, but agree in holding that the millennial age will be heralded by the personal return of the Lord Jesus, to establish a theocratic kingdom of universal righteousness, during which time sin will remain on earth but be greatly diminished. Immediately on Christ's appearing will take place the resurrection of the righteous dead and the translation of living Christians, who will be rewarded according to their works. The judgment work of Christ will occupy the whole millennial period. The Jews, restored to their own land, will repent and be converted. All the hosts of Antichrist will be destroyed, Satan bound, and the Holy Ghost poured out. At the end of the millennial age Satan released will make a last vain attempt to regain his power, but he and the wicked, who now have their resurrection, will be finally judged and cast into the lake of fire. The earth will be renewed by fire, and be the scene of the everlasting kingdom of Christ over all sanctified mankind. Attempts to fix the date of the advent are generally disapproved. Dates that have been fixed for the beginning of the millennium have been 1785 by Stilling, 1836 by Bengel, 1843 by Miller in America, 1866, 1867, and 1868 by Dr Cumming, and 1890 by the Mormon Church. Some adventists teach the doctrine of Apocatastasis (q.v.), others the final annihilation of the impenitent. See ADVENTISTS (SECOND), and HELL.

Many of the greatest modern German theologians have been more or less pronouncedly pre-millennialists; such as Rothe, Hofmann, Nitzsch, Ebrard, Lange, Delitzsch, Christlieb, Luthardt, as also Oosterzee, Gaussen, and Godet. The Free Church of Italy and the Plymouth Brethren collectively hold these views. The Irvingites expect the speedy appearance of Christ. Pre-millennial views appear in the works of many eminent Anglicans—such as Archbishop Trench, Bishops Ellicott and Ryle, Canons Fremantle and Hoare, Dean Alford. Amongst Presbyterians Dr John Cumming and Dr Horatius Bonar are conspicuous names. Great conferences of pre-millennialists were held in London and New York in 1878.

See Corrodi, *Geschichte des Chiliasmus* (1781; 2d ed. 1794); J. P. Lange, *Das Land der Herrlichkeit* (1838); Volck, *Der Chiliasmus* (1869); Bickersteth, *Glory of the Church* (1853); Bonar, *Coming of the Kingdom of the Lord Jesus* (1849), and *Prophetical Landmarks* (1859); Cumming, *Apocalyptic Sketches* (1849); E. B. Elliott, *Horæ Apocalypticæ* (5th ed. 1862); Seiss, *The Last Times* (7th ed. Phila. 1878); the *Pre-millennial Essays of the Prophetic Conference* (Chicago, 1879); and, against Millenarianism, David Brown, *Christ's Second Coming* (1846).

Millepede, a popular name for the members of one of the orders of Myriapods, of which Julus is a good type. See CENTIPEDE, MYRIAPOD.

Millepore. See CORAL.

Miller, HUGH, a distinguished self-taught geologist and journalist, was born at Cromarty, in the north of Scotland, October 10, 1802. He was descended from a family of sailors, and lost his own father by a storm at sea when he was only five years of age. In consequence of this misfortune he was brought up chiefly under the care of two of his mother's uncles, one of whom ('Uncle Sandy') imbued him with a taste for natural history, and the other ('Uncle James') for traditional lore. He acquired a good knowledge of English (the only language he knew) at the Cromarty grammar-school. Before his eleventh year he had read the usual romances of childhood, besides other works of higher literary pretensions. As he grew older he became extremely fond of the great English poets and prose-writers. From his seventeenth to his thirty-fourth year he worked as a common stone-mason, devoting the enforced leisure of the winter months to writing and reading, to independent researches in natural history, and to the extension of his literary knowledge. In 1824–25 he worked at Niddrie, near Edinburgh. In 1829 he gained the friendship of Robert Carruthers, editor of the *Inverness Courier*, and published a volume entitled *Poems written in the Leisure Hours of a Journeyman Mason* (1829), which was followed by *Scenes and Legends of the North of Scotland* (1835). His attention was soon drawn to the ecclesiastical controversies which were agitating Scotland, and his famous *Letter to Lord Brougham* on the 'Auchterarder Case,' brought him prominently into notice. In 1834–39 he acted as bank-accountant; in 1839 he was invited to Edinburgh by Dr Candlish and Robert Paul, who had read his famous letter, as editor of the *Witness*, a newspaper started in the interest of the Non-intrusion party in the Church of Scotland; and in 1840 he published in its columns a series of geological articles, which were afterwards collected under the title of *The Old Red Sandstone, or New Walks in an Old Field* (1841). These articles were very remarkable, from both a scientific and a literary point of view. They contained a minute account of the author's discovery of fossils in a formation believed, until then, to be destitute of them, and were written in a style which was a harmonious combination of strength, beauty, and polish. At the meeting of the British Association in the same year (1840) he was warmly praised by Murchison, Agassiz, and Buckland. Agassiz proposed that one of the fossils should be named *Pterichthys Milleri*, and said that 'he would give his left hand to possess such powers of description as this man.' Miller's editorial labours during the heat of the Disruption struggle were immense, and educated the people for the climax in 1843. He used the term 'Free Church' before the Disruption. In 1847 he had to vindicate his position as editor in a private pamphlet against clerical interference, and may be said to have come off triumphant. But, after years of hard, earnest, fagging toil, his brain gave way, and, in a moment of aberration, he shot himself at Portobello, near Edinburgh, on the night of the 23d December 1856. Miller contributed several tales to the series known as Wilson's *Tales of the Borders* (1835), and was also a contributor to *Chambers's Journal*. He was not a ready writer; Chalmers said of him that when he did go off he was a great gun, but he required a deal of time to load. Yet he contributed at least a thousand articles to the *Witness;* Peter Bayne terms them 'complete journalistic essays, symmetrical in plan, finished in execution, and of sustained and splendid ability.' Miller's works, besides those already mentioned, are *First Impressions of England and its People* (1847), the record of a journey to England in 1845; *Footprints of the Creator, or the Asterolepis of Stromness*, in which he combated the evolution theory (1850); *My Schools and Schoolmasters, or the Story of my Education* (1854); and *Testimony of the Rocks* (1857), an attempt to reconcile the cosmogony of Genesis with the geology of nature, by the hypothesis that the days mentioned in the first chapter of Genesis do not represent the actual duration of the successive periods of creation, but only the time occupied by God in unrolling a panoramic vision of these periods before the eyes of Moses. To the above list was afterwards added the following posthumous volumes: *Cruise of the Betsey* (1858), being geological investigations among the islands of Scotland; *Sketch Book of Popular Geology*, with preface by Mrs Miller (1859); *Headship of Christ*, with preface by Bayne (1861); *Essays, Historical and Biographical*

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(1862); *Tales and Sketches* (1863); *Edinburgh and its Neighbourhood* (1863); *Leading Articles*, with preface by Rev. John Davidson (1870).

Miller's services to science have undoubtedly been great, but he is even more distinguished as a man than as a savant. Honest, high-minded, earnest, and hugely industrious, he was a true Scot, a hearty but not a sour Presbyterian (for he loved Burns as much as he revered Knox); and there are few of whom Scotland has better reason to be proud than 'the stone-mason of Cromarty.' Miller was married to Lydia Mackenzie Fraser in 1837. She assisted him in literary work, and possessed good taste and ability. She wrote on *Cats and Dogs* (1856), and her eldest daughter, Harriet Miller Davidson, wrote several serial tales. Besides his autobiography quoted above, see the Life by Peter Bayne (2 vols. 1871).

Miller, JOAQUIN, the pen-name of Cincinnatus Hiner Miller, an American poet, born in Indiana, in 1841. Removing with his parents to Oregon in 1854, he became a miner in California, was with Walker in Nicaragua, and afterwards lived with the Indians till 1860. He then studied law in Oregon, and set up in practice in 1863, after a Democratic paper that he edited had been suppressed for disloyalty. He was a county judge from 1866 to 1870, and then visited Europe; in England his first volume of verse was published. He afterwards settled as a journalist in Washington, and in 1887 in California. In 1890 he revisited England.

His poems include *Songs of the Sierras* (1871), *of the Sunlands* (1873), *of the Desert* (1875), *of Italy* (1878), and *of the Mexican Seas* (1887); his prose works, *The Danites in the Sierras* (1881), *Shadows of Shasta* (1881), and *'49, or the Gold-seekers of the Sierras* (1884). He also wrote *The Danites*, a successful play, and *My Life among the Modocs* (1873).

Miller, JOE. See JEST-BOOKS.

Miller, WILLIAM. See ADVENTISTS.

Miller, WILLIAM HALLOWS (1801–80), professor of Mineralogy at Cambridge, is especially distinguished for his system of Crystallography (q.v.).

Miller's Thumb. See BULLHEAD.

Millet, a grain, of which there are several kinds, the produce of species of Panicum, Setaria, and allied genera. The genus Panicum contains many species, natives of tropical and warm temperate countries, and some of which, as Guinea Grass (q.v.), are amongst the largest fodder grasses. The flowers are in spikes, racemes, or panicles; the glumes very unequal, one of them often very minute; each spikelet containing two florets, one of which is often barren. The genus Setaria has a spike-like panicle, with two or more bristles under the glumes of each spikelet.—Common Millet (*Panicum miliaceum*) is an annual grass, three or four feet high, remarkably covered with long hairs, which stand out at right angles. It has a much-branched nodding panicle; the spikelets are oval, and contain only one seed. It is a native of the East Indies, but is extensively cultivated in the warmer parts of Europe and other quarters of the world. The grain, which is very nutritious, is only about one-eighth of an inch in length. It is used in the form of groats, or in flour mixed with wheat-flour, which makes a good kind of bread; but bread made of millet alone is brittle and full of cracks. Poultry are extremely fond of millet.—Other species, *P. miliare*, *P. frumentaceum*, and *P. pilosum*, are cultivated in different parts of India, chiefly on light and rather dry soils, yielding very abundant crops. Millet of various species is the staple food-grain of India as a whole, and not rice, as is often thought.—German Millet, or Mohar (*Setaria germanica*), and Italian Millet (*S. italica*)—regarded by many as varieties of one species, and probably originally from the East, although now naturalised in the south of Europe—are cultivated in many of the warmer parts of Europe, in India, and other countries. Italian millet is three or four feet in height; German millet is much lower, and its spike comparatively short, compact, and erect; it is less valuable as a corn-plant. The grains of both are very small, only about half as long as that of Common Millet; but they are extremely prolific, one root producing many stalks, and one spike of Italian millet often yielding two ounces of grain. The produce is estimated as five times that of wheat. The grain of these millets is imported into Britain for feeding cage-birds. It is used for soup in the south of Europe. To the same tribe of grasses belong the genera Paspalum, Pennisetum, Penicillaria, Digitaria, and Milium. *Paspalum exile* is common in Africa; and *P. scrobiculatum* is cultivated on poor soils in India. *Penicillaria spicata* or *Pennisetum typhoideum*, often called Egyptian Millet and Guinea Corn, is cultivated in Africa and India, and the south of Europe.—*Pennisetum distichum* causes much inconvenience to the traveller in Central Africa, the little bristles which are attached to its seeds making them stick to the clothes and pierce the skin.—*Digitaria sanguinalis*, or Polish Millet, is cultivated in Poland, where the grain is used like rice. It is a common grass in tropical and warm countries, and in many parts of Europe; in Britain it occurs in the south of England, where it is probably only an introduced weed of cultivation. The spikes in this genus are compound, and from their appearance give it the names Digitaria and *Finger-grass*.—The Millet Grass (*Milium effusum*) of Britain, occasionally found in shady woods, is a very beautiful grass, three or four feet high, with a spreading pale panicle of small flowers. Another species of the same genus (*M. nigricans*) is the *Maize de Guinea* of Peru, where its seeds are converted into a very white flour.—The name Indian Millet is sometimes given to Durra (q.v.).

a, Common Millet (*Panicum miliaceum*); *b*, German Millet (*Setaria germanica*).

Millet, JEAN FRANÇOIS, painter, was born in the village of Gruchy, near Gréville, on the 4th of October 1814. The son of a farmer, he owed much in his childhood to his grandmother, a woman of great piety and individuality, and to her brother, who had been a priest; and he was taught enough Latin to enjoy the Vulgate and Virgil. For a time he aided his father as a farm-labourer; but, having manifested great taste for drawing, he was at length, in 1832, placed under Monchel, a painter in Cherbourg, whom he assisted in the execution of two sacred subjects now in the church of the Trinity there, and who induced the municipality

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of Cherbourg to grant an annuity to aid his pupil in his studies, the sum being afterwards supplemented by the council of La Manche. In 1837 Millet came to Paris, and worked in the studio of Paul Delaroche, learning, however, more from his study of the works of Michael Angelo, Poussin, Correggio, and the Venetians. Next he painted and drew in pastels little subjects in the popular style of Boucher and Watteau, selling them to the dealers for a few francs; and in 1840 a portrait which he sent to the salon was accepted and hung. In the same year he returned to Normandy, where he painted portraits and even signboards. In 1841 he was again in Paris; and he struggled hard amid the revolutionary troubles that followed to maintain himself and his family by his art. In 1848 he fought at the barricades of the Quartier Roche-chouart; and in the following year he settled in Barbizon, near the Forest of Fontainebleau, along with Charles Jacque, and there made the acquaintance of Theodore Rousseau. At Barbizon, where he remained for the rest of his days, living much like the peasants around him, he began in good earnest to paint the life of rustic France, entering on his task with a sympathetic power such as no other painter has shown. Here the famous 'Sower' was completed in 1850, mainly, however, from recollections of Normandy. In 1855 his 'Peasants Grafting' won Gautier's praise, and was bought by an American for 4000 francs. It was followed by 'The Gleaners' in 1857, 'The Angelus' (1859), 'Waiting' and 'The Sheep-shearers' (1861), 'The Man with the Hoe' and 'Women Carding' (1863), 'Shepherdess and Flock' (1864), works in which, without any departure from the most absolute truth, he imparted a largeness and a pathetic dignity to his figures of the men and women who labour in the fields, and to their environments of ordinary nature. In addition to paintings, he produced many charcoal drawings of a very high quality, and he etched a few plates. All his life long he struggled against the pressure of poverty, though he was awarded medals at the salons of 1853 and 1864, and a first-class medal at the Paris International Exhibition of 1867, when he also received the ribbon of the Legion of Honour. He died at Barbizon, 20th January 1875. Since his death he has been fully recognised as one of the greatest of French painters; and the productions of his brush have realised very large prices. At the Sécrétan sale in Paris, in 1889, his most celebrated picture, 'The Angelus,' sold—along with the government commission of 5 per cent.—for £23,226; it was afterwards exhibited for a year in the United States.

See works on Millet by Piedagnel (1876), Sensier (Eng. trans. 1881), Yriarte (1884); D. C. Thomson, *The Barbizon School* (1890); and Ménard, *Le Livre d'Or de Millet* (1890).

Milliard, the French collective name for a thousand millions; familiar in connection with the five milliards of france (5000 millions of francs, or £200,000,000) paid by France as war indemnity to Germany in 1871–73 (see FRANCE, Vol. IV. p. 783).

Millom, a town of Cumberland, on the west side of the Duddon estuary, 30 miles SSE. of Whitehaven. It has mines and ironworks. Pop. (1851) 1070; (1881) 6228.

Millport. See CUMBRAE.

Millstone Grit. See CARBONIFEROUS SYSTEM, and MILL.

Milman, HENRY HART, dean of St Paul's, poet and ecclesiastical historian, was the youngest son of Sir Francis Milman (1746–1821), physician to George III., and was born in London, 10th February 1791. He was educated at Greenwich under Dr Burney, at Eton, and at Brasenose College, Oxford, where in 1812 he won the Newdigate with his *Belvidere Apollo*, the best of all Oxford prize poems. In 1815 he was elected a fellow; in 1816 was ordained priest, and appointed vicar of St Mary's, Reading; from 1821 to 1831 was professor of Poetry at Oxford, where in 1827 he delivered the Bampton Lectures, on *The Character and Conduct of the Apostles considered as an Evidence of Christianity;* in 1835 became rector of St Mary's, Westminster, and a canon of Westminster; and in 1849 was promoted to the deanery of St Paul's. He died at Sunninghill, near Ascot, 24th September 1868, and was buried in St Paul's.

The collected edition of Dr Milman's *Poems and Dramatic Works* (3 vols. 1839) comprises *Fazio, a Tragedy* (1815), which, without his consent, was acted first at Bath, and then in 1818 at Covent Garden, with Charles Kemble and Miss O'Neil in the leading parts; *Samor, Lord of the Bright City, an heroic poem* (1818); *The Fall of Jerusalem* (1820), a beautiful dramatic poem, with some fine sacred lyrics interspersed; three other dramas, *The Martyr of Antioch* (1822), *Belshazzar* (1822), and *Anne Boleyn* (1826); and *Nala and Damayanti, with other Poems translated from the Sanskrit* (1834). Forgotten as a whole, the poems live, and will live, through three or four much prized hymns—'When our heads are bowed with woe,' 'Brother, thou art gone before us,' and 'Ride on, ride on in Majesty.' The complete edition of Dean Milman's *Historical Works* (15 vols. 1866–67) includes his *History of the Jews* (1829), *History of Christianity to the Abolition of Paganism in the Roman Empire* (1840), and *History of Latin Christianity to the Pontificate of Nicholas V.* (1854–56). The last—'a complete epic and philosophy of mediæval Christendom'—is Milman's masterpiece; it is really a great work, great in all the essentials of history—subject, style, and research. But, though vastly inferior, the *History of the Jews* was in a way more important. For 'it was,' in Dean Stanley's words, 'the first decisive inroad of German theology into England; the first palpable indication that the Bible "could be studied like another book;" that the characters and events of the sacred history could be treated at once critically and reverently.' Milman also edited Gibbon and Horace, and wrote much for the *Quarterly Review*. After his death appeared the delightful *Annals of St Paul's Cathedral* (1868), and *Savonarola, Erasmus, and other Essays* (1870). See an article by Dean Stanley in *Macmillan's Magazine* for January 1869.

Milne-Edwards, HENRI, naturalist, was born at Bruges, 23d October 1800. His father was an Englishman. Milne-Edwards studied medicine at Paris, where he took his degree of M.D. in 1823, but devoted himself to natural history. After having for many years taught natural history at the Collége de Henri IV., he was elected in 1838 member of the Académie des Sciences in the place of Cuvier. In 1841 he filled the chair of Entomology at the Jardin des Plantes, and in 1844 became also professor of Zoology and Physiology. He was a member of the Académie de Médecine, and of most of the learned academies of Europe and America, and held several orders—amongst others, since 1861, that of Commander of the Legion of Honour. He published numerous original memoirs of importance in the *Annales des Sciences Naturelles*, a journal he himself assisted in editing for fifty years. His *Eléments de Zoologie* (1834), when reissued in 1851 as *Cours Elémentaire de Zoologie*, had an enormous circulation at home and abroad, and long formed the basis of most minor manuals of zoology published in Europe. His *Histoire Naturelle des Crustacés* (1834–40) and *Histoire Naturelle des Coralliaires* (1857–60) were almost equally noteworthy. The *Lectures on the*

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Physiology and Comparative Anatomy of Man and the Animals (14 vols. 1857–81) have a great permanent value for their immense mass of details, and copious references to scattered sources of information. He also had an important share in a splendid quarto of *Anatomical and Zoological Researches on the Coasts of Sicily*. Other works were researches on the natural history of the French coasts (1832–45) and on the natural history of the mammalia (1871). In some of his later works he was assisted by his distinguished son Alphonse. Milne-Edwards must always hold high rank amongst the naturalists of the 19th century. His researches in the distribution of the lower invertebrates led him to the theory of centres of creation; and to this he adhered throughout life, in spite of the general acceptance of the newer and larger views of Darwin by his fellow-scientists. He died on the 29th July 1885. His elder brother, Frederick William, was almost equally celebrated. He founded the Ethnological Society in Paris, and is considered the father of ethnology in France.

Milner, JOSEPH, an ecclesiastical historian, was born near Leeds in 1744. He studied at Catharine Hall, Cambridge, and afterwards became well known as head-master of Hull grammar-school. He was vicar of North Ferriby, 7 miles from Hull, and lecturer in the principal church of the town, and in 1797 became vicar of Holy Trinity Church. He died on 15th November of the same year. Milner's principal work is his *History of the Church of Christ*, of which he lived to complete three volumes, reaching to the 13th century; a fourth volume coming down to the 16th century, was edited from his MSS. by his younger brother, Dr Isaac Milner, dean of Carlisle, who also published a complete edition of his brother's works in 8 vols. 1810. The principles on which the history is written are of the narrowest kind; the scholarship, literary style, and critical insight are alike poor.

Milnes, RICHARD MONCKTON. See HOUGHTON.

Milngavie (pron. *Millguy*), a town of Stirlingshire, 7 miles NNW. of Glasgow. Pop. 2636.

Milo. See MELOS.

Milo, of Crotona, in Magna Græcia, an athlete famous for his great strength. He was six times victor for wrestling at the Olympic games, and as often at the Pythian, and commanded the army which defeated the Sybarites in 511. On one occasion he is said to have carried a live ox upon his shoulders through the stadium of Olympia, and afterwards to have eaten the whole of it in one day; and on another, to have upheld the pillars of a house in which Pythagoras and his scholars were assembled, so as to give them time to make their escape when the house was falling. In old age he lost his life through too great confidence in his own strength, in attempting to split up a tree, which closed upon his hands, and held him fast until he was devoured by wolves.

Milrei, or MILREA, a Portuguese silver coin and money of account, contains 1000 rees, and is valued at 4s. 5d. sterling. The coin is commonly known in Portugal as the *corôa*, or 'crown,' and is (since 24th April 1835) the unit of the money-system in that country. It is also used in Brazil. Coins of the values of a half-corôa, or half-milrei, as well as the one-fifth, one-tenth, and one-twentieth, are current in both countries as money of account.

Milt. See FISHES, Vol. IV. p. 654.

Miltiades, a celebrated Athenian general, who was tyrant of a colony in the Thracian Chersonesus, took part with Darius Hystaspes against the Scythians, and, when Attica was threatened by the great Persian invasion, was chosen one of the ten generals. He prevailed upon the polemarch Callimachus to give his casting vote in favour of risking a battle, and when his turn came to command drew up his army on the famous field of Marathon. The victory of the Athenians and one thousand Platæans over the Persian host of Datis and Artaphernes is justly counted one of the decisive battles of the world. Miltiades, being entrusted anew with the command of an armament, made an attack on the island of Paros in order to gratify a private enmity, but, failing in the attempt, was on his return to Athens condemned to pay a fine of fifty talents as an indemnity for the expenses of the expedition. Being unable to do this, he was thrown into prison, where he died of a wound received at Paros. The fine was exacted after his death from his son Cimon.

Milton, JOHN, after Shakespeare the greatest English poet, was born in Bread Street, Cheapside, on December 9, 1608. His father, John Milton, was a prosperous scrivener, a Puritan but a musician, and composer of several pieces much admired by his contemporaries. He was descended from a family of yeomen settled in Oxfordshire, and had come to town upon being disinherited for his religious convictions by his father, a Catholic recusant. He appears to have from the first discerned the promise of his son, and to have determined to give him the best education he could. After studying under private tutors, young Milton was admitted about 1620 into St Paul's School, where he distinguished himself not only as a scholar, but as a poet. In February 1625 he entered Christ's College, Cambridge. His academical course was not wholly smooth; he seems to have been chastised—not, as the legend says, flogged—by his tutor, and was certainly rusticated for a short time in 1626. After his return, however, he went through the university course with credit, graduating as Bachelor at the proper time, and proceeding Master of Arts in July 1632. The condition of the church, over which Laud then ruled supreme, deterred the young Puritan from taking orders; he felt no vocation towards any other profession; and at Horton, in Buckinghamshire, where his father had retired upon the fortune he had acquired in business, he settled quietly down with the distinct purpose of making himself a poet by study and self-discipline. His poetical genius had already been attested by two noble productions, the 'Hymn on the Nativity,' and 'At a Solemn Music,' as well as much Latin verse of the highest quality; but it is remarkable how little stimulus he seems to have felt to occasional composition. During his six years' residence at Horton he produced, so far as known, only two English poems of importance which can be ascribed to direct poetical impulse from within, the *Allegro* and the *Penseroso*. *Comus* was written at the instance of his friend, the musician Henry Lawes, to celebrate Lord Bridgewater's assumption of the wardenship of the Welsh marches, and was performed at Ludlow before a select assemblage in September 1634. *Lycidas* was evoked by the death of his friend, Edward King, shipwrecked on his passage to Ireland in 1637. There is, perhaps, not another instance in literature of a great poet so entirely dependent upon circumstances for inspiration, and, while meditating the highest things, so content to bide his time in calm reliance upon his ability to do what he pleased when he pleased. The four productions of this Horton period were indeed of themselves sufficient to place him in the first rank of English poets. Their most individual characteristic is perhaps chastened exuberance—boundless poetical wealth severely controlled, and splendidly displayed without lavish-

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ness or ostentation. *Comus* and *Lycidas* tell us much of the man; in the former we see the scholar's disdain, perhaps slightly tinged with moroseness, for all save intellectual pleasures; in the latter the patriot and the Puritan speaks his bitter scorn of the ruling faction in the church. Perhaps he had spoken too freely; at all events very shortly after the publication of his elegy, about the beginning of 1638, as part of an obituary collection in memory of Edward King, he left England for a tour in Italy.

Milton's visit to Italy is one of the most agreeable chapters of his life. He was cordially received by the Italian literati, especially at Florence, where he made not only pleasant acquaintanceships, but permanent friendships. At Rome, notwithstanding his undaunted profession of Protestantism, he was treated with especial attention, and at Naples the venerable Marquis Manso, half a century earlier the protector of Tasso, gave him hospitality and presents, which Milton requited with an elegant Latin poem. The impression which Milton thus produced upon foreigners is a proof of something imposing and attractive in his personality, for all his solid claims to fame were of course a sealed book to the Italians. His journey home was hastened by news of the outbreak of hostilities between Charles I. and the Scots, and his return was saddened by tidings of the death of his friend Diodati, whom he celebrated in his elegy 'Damon,' the finest and the last of his Latin poems. He settled in St Bride's Churchyard, afterwards in Aldersgate Street, and devoted himself to the education of his widowed sister's children, the two young Phillipses. Unconscious of the long farewell he was about to bid to poetry, he occupied his leisure with schemes for poems mostly dramatic and scriptural, of which numerous skeleton outlines are preserved. The conception of *Paradise Lost* as a mystery or miracle play gradually dawned upon his mind, and Satan's address to the Sun was actually written about this time. But the Civil War came, and for long silenced Milton's muse, except for an occasional sonnet.

It has been much debated whether the world has lost or gained more by Milton's absorption in politics. The question is somewhat idle: to wish for Milton other than he was is to wish for a succession of *Comuses* rather than a *Paradise Lost*. No man capable of conceiving such a work as Milton's epic could be unaffected by the situation of his country at that tremendous crisis, and with Milton's poetical temperament lively interest in anything signified total occupation by it for the time. The tracts which he now poured forth are as truly lyrical inspirations as any of his poems; by no means masterpieces of reasoning, but dithyrambic ecstasies of love or hate. Three appeared in 1641, two in 1642. All five relate to church government: never was diction so magnificent called forth by a theme so unpromising. In fact, however, the writer's thoughts are much higher and deeper than his subject, and, stripped of what is temporary and accidental in the latter, they appear magnificent idealisations of the possibilities of a far-off future, which to Milton seemed ever at the door. The great drawback to their enjoyment at the present day is the scurrility of their invective, which passed comparatively unperceived amid the excitement of revolution.

In 1643 Milton's activity as a public writer was diverted into a new channel by private affairs, which, however, he so handled as to render of universal concern. In June of this year, after a very short courtship, he married a young lady, Mary Powell, daughter of an Oxfordshire squire, previously known to him as a debtor to his father for money advanced on mortgage. The bride's family were cavaliers, and she would seem to have been as little suited to her husband in every other respect as by her education and connections. The idealising imagination of the poet must in all probability have been at work, and the thoughtless precipitancy of the whole transaction would alone show how greatly in many respects the popular estimate of Milton's character needs revision. The poor girl was naturally shocked at the sudden transfer from a jovial country household to the apartments of an austere scholar, whose intellect and character she was utterly unable to appreciate, and whose principles ran counter to all her prejudices. After a few weeks' trial of matrimony she went back to her friends, under a promise, Milton's nephew says, to return at Michaelmas; but doubt is cast upon this statement by the fact, discovered by Professor Masson, that Milton's first tract on divorce was written and printed at the very time of the separation. She certainly did not return, and early in the following year Milton put forth another edition of his *Doctrine and Discipline of Divorce*, greatly extended, and enriched with erudition and argument. It brought many attacks upon him, mainly from the Presbyterians, from whose views on church and state he had been more and more dissociating himself. He replied to his opponents in three supplementary pamphlets, and a threat of prosecution by a parliamentary committee, which came to nothing, occasioned the production (November 1644) of the most famous of his prose-works, *Areopagitica, a Speech for the liberty of Unlicensed Printing*, which has come to be regarded as almost the gospel of freedom of speech, and, if less eloquent than his tracts on church government, nevertheless contains the best known passages of his prose-writings. It must be remembered that even here Milton does not contend against the prosecution of published opinions deemed pernicious, but merely against the right to forbid publication through the instrumentality of a licenser. A few months previously he had composed and published, at the instance of his friend Samuel Hartlib, a *Tractate of Education*, of little practical pedagogic value, but full of inspiration and suggestion.

Milton was not the man to permit his opinions to remain empty speculations, and in the course of 1645 he was taking serious steps towards carrying the most obnoxious of them into practice by paying his addresses to 'a very handsome and witty gentlewoman,' when the absent wife thought it time to return. Her repentance may probably have been further stimulated by the overthrow of the Royalist cause, which had occasioned the total ruin of her family. Conscious, probably, of his own failings in temper and considerateness, Milton did not prove obdurate; and by September his household was re-established in the Barbican. She further induced him to receive her mother and other members of her impoverished family, persons whom he had little reason to love, and of whose incompatibility he complains in a letter to an Italian friend. Little else can be said of her, except that she brought him three daughters, and died in 1652. He lost the father to whom he owed so much in 1647, a year after the fruits of his education and the partial accomplishment of the purpose of his life had been manifested in a collected edition of his poetical works, English and Latin.

During all this time Milton's calling, apart from his studies and polemics, had been educational; other pupils, mostly sons of friends, had been gradually added to his nephews, and he seemed to the world a schoolmaster. He was now to enter public life. The execution of Charles I., January 30, 1649, was followed within a fortnight by his

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defence of the deed, *The Tenure of Kings and Magistrates*. Having thus definitively cast in his lot with the ruling party, he was appointed on March 15 to a post which no other man in England was so competent to fill, that of 'Secretary of Foreign Tongues,' whose duty it was to draft diplomatic correspondence with foreign powers, then carried on in Latin. Milton had few equals in that age as a Latinist, whether in prose or verse, and his public letters were an honour to himself and his country, but there is no reason to suppose that he was ever much more than the mouthpiece of the government. His services were more conspicuous in another department, his justification of the king's execution in his reply to Salmasius's *Regii Sanguinis Clamor ad Cœlum*, a pamphlet whose publication had been a European event. Milton's *Pro Populo Anglicano Defensio* (1651) was pronounced, even by those who condemned it, a great controversial victory. In erudition, Latinity, and, it must be added, scurrility, the combatants were well matched, but Milton spoke from the heart, and Salmasius from a brief. This work, now so little read, made Milton famous all over Europe, and is memorable as the immediate occasion of the loss of his eyesight, deliberately yielded up by him in the cause of his country. By 1652 the impaired vision had wholly failed, and it was necessary to provide him with an assistant in his official duties. His domestic life at this period was tranquil, distinguished chiefly by his second marriage and the loss of his wife (1656–58), and the pleasing intimacy of young friends, recorded in his sonnets. The magnificent sonnet on the massacre of the Vaudois was written in 1655. Several controversial pamphlets with Alexander Morus followed his contest with Salmasius, chiefly remarkable for the fortitude and dignity of his references to his affliction, and for his flattering portraits of the great men of the Commonwealth, especially Cromwell. Always leaning to the more radical side, he had supported Cromwell in all his extra-legal measures, though the disappointment of his early republican ideal must have cost him many pangs. He retained his secretaryship until the abdication of Richard Cromwell, when the condition of public affairs again made him a pamphleteer. His writings of this period, greatly inferior in splendour of diction to his first productions of the kind, are still most interesting as passionate protests, conclusive of his entire lack of practical statesmanship and his essentially poetical temperament. The Restoration drove him into concealment. Few had more bitterly exasperated the Royalist party; but the new government was not bloodthirsty, and about the beginning of 1661 he found himself settled in Jewin Street (afterwards in Artillery Walk, Bunhill Fields), honourably released from politics with the gratifying consciousness of having done his duty and his best, and free to devote himself entirely to the permanent purpose of his life.

Paradise Lost was probably commenced some time before the Restoration, and completed about 1663—a striking instance of rapid composition, considering the magnitude and perfection of the work, the interruption by political revolution, and the fact that Milton's poetical vein only flowed freely between the autumnal equinox and the vernal. It was chiefly composed at night, and necessarily dictated to some amanuensis, usually one of his daughters. Plague and fire for a time warred against the publication, which at length, after some difficulty on the licenser's part had been surmounted, took place in August 1667. Every one knows that the copyright was sold for five pounds: it is not always remembered that that sum represented three times its value at the present day, and that there were contingencies which, had Milton lived to benefit by them, would have raised his emolument to about £70 of our money. The sale of thirteen hundred copies within twenty months is certainly no discredit to the taste of the age. Milton's claim to a place among the great poets of his country seems to have been admitted from the first, though in the absence of reviews his fame travelled slowly. The year 1671 witnessed the publication of *Paradise Regained*, probably written in 1665–66, and of *Samson Agonistes*, written later still. The former was composed at the suggestion of the Quaker Ellwood, working on the suspicion Milton could not but entertain that he had after all made Satan the hero of *Paradise Lost*. *Samson Agonistes*, dramatic in form, is lyrical in substance, a splendid lament over the author's forlorn old age, and the apostasy, as he deemed it, of his nation. Both pieces evince the continued tendency of his style towards simplicity, which sometimes degenerates into baldness. They are noble pendants to *Paradise Lost*, but the more their relation to this palmary work is studied the more one feels that it and it alone places him among the supreme poets of the world.

Milton's domestic life during this period had not been fortunate. The great cause of sorrow was the undutifulness of his daughters—very ordinary young women, it would seem, who felt no sympathy or admiration to counterbalance their natural impatience of their heavy task as his readers and amanuenses. The blind poet on his part was no doubt often stern and exacting; and on the whole the history of his household is one of sordid sadness up to his marriage (1663) with Elizabeth Minshull, a pretty and domestic woman of twenty-five, the daughter of a Cheshire yeoman. She restored comfort to his house, but failed to conciliate his daughters, who, after being taught embroidery at their father's expense, left to set up for themselves. The accounts we have of him in his later years convey a generally pleasing picture of a not uncheerful retirement solaced by music and the attention of friends. When the poetic impulse had departed he addressed himself vigorously to other unfulfilled designs of his youth, writing the early history of England and endeavouring to amend men's conceptions of grammar and logic. These writings are indeed of little value; but his Latin *Treatise of Christian Doctrines*, though devoid of all pretensions to eloquence, is a memorable work. His theology had become profoundly modified in the course of his life; he is now an Arian as regards the person of Christ; he is indifferent to all rites and ceremonies; he is as anti-Sabbatarian as Luther; he would even tolerate polygamy. The charm of the treatise consists in its dignified candour, and the absence of all polemic virulence. The tranquillity of evening was indeed closing around him as he penned this last legacy, the MS. of which, confiscated and mislaid, was not to see the light for a hundred and fifty years. Reduced still further in means by losses through the great fire of 1666, but still above want; execrated as a regicide by the majority of his countrymen, but already acclaimed by the discerning as the first poet of his age; worn by attacks of gout, but cheerful and even joyous in the intervals of pain, he closed his chequered life on November 8, 1674. He was interred in St Giles's, Cripplegate.

Milton is one of the poets respecting whose place in literature there has been least question, whether as regards the literature of their own country or that of the world. He stands at the head of those epic poets whose themes have not, like Homer's or Virgil's, been national, or have not, like Dante's, condensed the essence of the belief of ages. He is indebted for this superiority partly to his felicitous choice of the finest subject which yet remained for

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epical treatment, partly to his exceptional qualifications for treating it, but most of all to the actual superiority of his genius. After Homer there is no poet to whom the sublime is so much a native element, who rises into it with so little apparent effort, and remains in it for so long together. Another circumstance which would alone make him a poet for the world is that in him and in him alone the Hebraic and the Hellenic spirit appear thoroughly at one. His theme and his creed connect him with the Scriptures, but his literary tastes and models are the tastes and models of the Renaissance. As an English poet he fills up the great gap which would otherwise yawn between the age of Shakespeare and the age of Dryden, and, like Wren in architecture, proves that the classical style need not necessarily be synonymous with pedantry or inanity. In the artful harmony of blank verse he surpasses every English poet, though he may not have caught the 'wood-notes wild' of Shakespeare and his contemporaries. His magnanimity as a man matched his sublimity as a poet; but he had perhaps more than a usual share of the failings attendant upon the magnanimous character, and at first sight appears arrogant and unamiable. It is not until we consider that the circumstances of his life forced these characteristics into prominence, and that biographers have too commonly thought the softer and more familiar traits unworthy of record; until we remember that the company of this austere idealist was frequented by the young, and that the pleasures of the social hour have been exquisitely sung by him; above all, until we note his almost entire dependence for composition upon external impulse, the rashness of some of his actions and the chivalry of others, that we perceive him to have possessed his full share of the emotional temperament common to poets.

The principal contemporary authority for Milton's life is his nephew, Edward Phillips. Toland has added some interesting notices. Symmons, Mitford, Todd, and others wrought usefully in their day in collecting and investigating particulars, but their labours have been entirely superseded by Professor Masson (6 vols. 1876–79), who has left nothing unexplored, and whose verdict is in most cases decisive. Johnson's short biography, however, must always be read for its literary merit, and as a remarkable instance of insuperable antipathy striving to be just. Milton's Life has been written on a small scale by Mark Pattison ('Men of Letters,' 1880) and by Richard Garnett ('Great Writers,' 1889, with full bibliography). There is an excellent and comprehensive German biography by Alfred Stern (2 vols. Leip. 1877-79). Addison, Johnson, Channing, and Macaulay are especially distinguished among Milton's critics.

Millville, a city of New Jersey, on the Maurice River, 41 miles by rail S. by E. of Philadelphia. It has manufactures of cottons and glass. Pop. (1885) 8824.

Milwaukee, capital of Milwaukee county, Wisconsin, and the largest city in the state, is situated on the west shore of Lake Michigan, at the common mouth of three improved and navigable rivers, which, with a canal, supply 20 miles of dockage. It is 85 miles by rail N. of Chicago, and overlooks Milwaukee Bay, which has a width of 7 miles and contains a harbour of refuge. The parked and terraced bluffs have an average height of 80 feet above the water. Milwaukee is beautifully built with light yellow bricks—to which it owes its name of 'the Cream City.' The streets are wide and parked between the roadway and the sidewalk, and are lined on either side by magnificent elms whose branches form an almost continuous arch in the residential parts. The public parks contain some 600 acres, and are connected by wide boulevards. There are nineteen street railway lines, nearly all operated by electricity, and the streets are mainly lighted by arc lights. A new and vast system of intercepting sewers is partly in operation, and in the meantime the river, into which much of the sewage flows, is flushed by means of a huge tunnel from the lake, built at a cost of $250,000. In 1889 two new railway passenger depôts were built at a cost of $200,000 each. Appropriations have been made for a new government building to cost $2,000,000, a new city hall, and a public library and museum building. The public library contains nearly 60,000 volumes. In 1888 was completed the Layton Free Art Gallery, the gift for which, exclusive of the value of pictures and statuary, was $300,000. There are 123 churches, and 45 public and 67 private and parochial schools, with 831 teachers and, in 1889, 42,835 pupils. The public-school expenditure for 1889 was $409,012. The charitable homes, hospitals, and asylums have a capacity of 2474, and the annual expenditure is about $75,000.

Milwaukee is essentially a manufacturing city. The value of its products in 1889 was more than $100,000,000, of which $14,000,000 was in engines, machinery, and iron and brass products, $10,500,000 in beer, $10,000,000 in slaughtering and packing, $6,000,000 in flour, &c. The number of manufacturing establishments was 1997; capital, $40,000,000; number of hands, 46,707. The 'jobbing' trade in the same year amounted to $94,000,000. The total receipts of grain of all kinds were 20,474,275 bushels. Milwaukee is a port of entry for goods in bond both by rail and water. Value of direct imports (1889), $755,658; number of vessels arriving, 5563, with an aggregate tonnage of 2,895,337. Milwaukee is the meeting-point of 14 railway lines and 11 lake steamship lines regularly employing 68 steamers. Pop. (1870) 71,440; (1880) 115,578; (1890) 203,947 within the city limits (18 sq. m.).

Mîmânsâ (from the Sanskrit *mân*, 'to investigate;' hence, literally, investigation) is the collective name of two of the six divisions of orthodox Hindu philosophy. It is distinguished as *Pûrva-* and *Uttara-mîmânsâ*, the latter being more commonly called *Vedânta*, while the former is briefly styled *Mîmânsâ*. Though the Mîmânsâ is ranked, by all native writers, with the five other philosophical systems, the term philosophy can scarcely be applied to it in the same sense as to them; its object is merely to lay down a correct interpretation of such Vedic passages as refer to the Brâhmanic ritual, to solve doubts wherever they may exist on matters concerning sacrificial acts, and to reconcile discrepancies—according to the Mîmânsâ, always apparent only—of Vedic texts. See SANSKRIT, VEDAS.

Mimes, the name given by the ancients to certain dramatic performances, in which, with little attempt at art, scenes of actual life were represented, sometimes in improvised dialogue. The Greek mimes appear to have been invented by the Greeks of Sicily and Southern Italy. They were a favourite amusement of convivial parties, the guests themselves being generally the performers. Sophron of Syracuse (about 420 B.C.) composed many in the Doric dialect, which were much admired, and which Plato was accustomed to read.—The Roman mimes were not borrowed from the Greek, but were of native Italic growth. They were not only far ruder and coarser, but in some respects they were essentially different—the dialogue occupying a smaller place, and mere gesture and mimicry predominating. The humour and satire, however, were often genuine, though rough and even indecent, and they were greatly relished by all classes; even the patrician Sulla was fond of them. Their most famous mimic poets were Decimus Laberius and Pub. Syrus.

Mimicry. The fact that insects belonging to very different groups often bear an extremely

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close superficial resemblance to each other has been known for a long period of time. The names given to various species of British moths are sufficient proofs of this. Such names as Bombyliformis, Apiformis, Bembeciformis, &c. imply a recognition of the resemblance between these species and others belonging to an entirely different order. The meaning of such likenesses was, however, unknown until the appearance of H. W. Bates's classical paper in 1862. In this essay the author shows that the species which has departed from the normal type of its group (the mimicker) is far rarer than the form which it resembles, while the latter (the mimicked) is abundant and well defended by some special protection, such as the possession of an unpleasant taste or smell or the power of stinging. Bates's observations were conducted in tropical America, where abundant, conspicuous, slow-flying, nauseous butterflies (Heliconidæ and Danaidæ) are closely mimicked by Pieridæ (the family containing our common garden white butterflies) and other butterflies, and in many cases by day-flying moths. Subsequent observation has confirmed Bates's suggestion. Wallace found numerous instances of mimicry among the Lepidoptera of India and the Malay Archipelago, and Trimen directed attention to similar facts among South African butterflies. The latter include the most remarkable instance of mimicry yet discovered. The male of a South African swallow-tailed butterfly (*Papilio cenea*) is typical in appearance and possesses the characteristic 'tails' on the hind-wings: the female is utterly unlike the male in the colouring and form of the wings, the 'tails' being entirely absent. While the female is so different from the male of its own species it appears in three well-marked varieties mimicking three different species of the nauseous genus Danais —viz. the black brown-spotted *D. Echeria*, the

black and white *D. niavius*, and the black reddish-brown and white *D. chrysippus* (see fig. 2A). In West Africa a closely related swallow-tail (*P. merope*) has a very similar male, and females mimicking *D. chrysippus* and the West African form of *D. niavius*. While such remarkable changes have occurred on the mainland of Africa, the ancestral form from which these mimetic species have been developed has been preserved comparatively unchanged in the island of Madagascar, as the closely related *Papilio meriones* in which the female much resembles the male and is non-mimetic. Similar species with sexes almost alike have been found in the Comoro Islands (*P. humbloti*) and in Abyssinia (*P. antinorii*). This example strongly enforces a conclusion also arrived at by Bates and Wallace—viz. that the females are far more frequently mimetic than the males. Wallace has explained this because of the especial dangers incurred by the female during her slow flight when laden with eggs, and her exposure to attack during oviposition.

The examples selected for illustration were lent by Colonel Swinhoe; the figures are about half the natural size. Fig. 1 represents the male of the Indian and African *Hypolimnas misippus:* it is non-mimetic and very unlike the female, being distinctly marked with a large iridescent blue spot on each of the four wings. The iridescent spots on the right wings appear to be larger than those on the left, because they are seen at a different angle. The male remains unchanged in the localities where its female alters in correspondence with the form it mimics. Fig. 2 is the commonest form of female, which mimics the above-mentioned *Danais chrysippus* (fig. 2A), occurring nearly all over the Old World. In Aden and some parts of Africa the latter butterfly is represented by a variety or sub-species with white hind-wings (*Danais alcippus*); see fig. 3A. In the same localities there is a similar variety of the female Hypolimnas (the *alcippoides* form), shown in fig. 3. Finally, in Aden and certain African localities there is another variety or sub-species of the Danais (*D. dorippus*) without the black and white marks at the tip of the fore-wing, shown in fig. 4A; while the Hypolimnas follows with a similar form of female, seen in fig. 4. This latter is also common in the south-west of India, where it has been stated that the mimicked form (*D. dorippus*) does not occur. Colonel Swinhoe, however, felt sure that the existence of the mimicker implied the former presence of the mimicked species. He tested this hypothesis by examining large numbers of the Danais, and he found that the *dorippus* form does exist in that part of India, although it is extremely rare: he came across about a dozen in four or five years. It is probable that *dorippus* has been nearly supplanted by the dominant form *chrysippus*, the resemblance between the two being sufficiently close for the mimic of the former to be mistaken for the latter. The case forms a most interesting exception to Wallace's third law quoted below.

The butterflies which afford models for mimicry chiefly belong to the two families Danaidæ (including Euplœa, Danais, and Hestia) and Acræidæ, in addition to the Heliconidæ of tropical America. There is some direct and much indirect evidence to show that all mimicked species are specially protected by an unpleasant taste or smell. Wallace has concisely stated the conditions under which mimicry occurs, as follows: '(1) That the imitative species occur in the same area and occupy the same station as the imitated. (2) That the imitators are always the more defenceless. (3) That the imitators are always less numerous in individuals. (4) That the imitators differ from the bulk of their allies. (5) That the imitation, however minute, is *external* and *visible* only, never extending to internal characters or to such as do not affect the external appearance.'

Examples of mimicry are also well known in other orders of insects. The formidable Hymenoptera (including the hornets, wasps, bees, and ants) are frequently resembled by defenceless insects belonging to other orders, such as moths (Lepidoptera), beetles (Coleoptera), flies (Diptera), &c. The most remarkable example yet described was discovered by W. L. Sclater in tropical America. The leaf-cutting ants (Œcodoma) are extremely abundant in this part of the world, and present a

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very characteristic appearance, each homeward-bound ant carrying a piece of leaf vertically in its jaws. Sclater found a homopterous insect which faithfully resembled an ant together with its piece of leaf. The latter was suggested by the thin compressed green body of the insect, and its profile was precisely like that of the jagged edge of the fragment of leaf held over the back of the ant.

The mimicking may be separated from the mimicked species by a still wider interval. Spiders in many parts of the world are defended by resembling the aggressive and justly respected ants. Again, many large caterpillars intimidate their foes by resemblance to snakes. The extraordinary prevalence of mimicry among insects is probably to be explained by their usual defenceless condition, and by their immense fertility and the rate at which the generations succeed each other—conditions which strongly favour the rapid action of natural selection. Hence it is that other forms of protective resemblance are also especially characteristic of insects (see articles BUTTERFLY and CATERPILLAR in this work). Mimicry is, however, by no means unknown in other animals. Thus, the gaudy colours of the deadly coral snakes (Elaps) of tropical America are mimicked by harmless snakes; and the powerful friar-birds are resembled by defenceless orioles in various Malayan islands. All the instances cited above illustrate protective mimicry—a resemblance which serves to defend the imitator from attack. But there are other although far rarer examples of aggressive mimicry, in which the resemblance favours the attack of the imitator upon the mimicked species or upon species which accompany the latter. Thus, the larvæ of certain flies (Volucella) feed upon the larvæ of humble-bees and wasps. The parent fly resembles the humble-bee or wasp, and is thus less likely to arouse suspicion when engaged in laying its eggs in or near the nest.

Mimetic appearances are often combined with other methods of defence; thus, many large caterpillars are well concealed by protective resemblance, and only assume the terrifying snake-like appearance

I. Colours which cause an animal to resemble some part of its environment, or to mimic the appearance of some other species (APATETIC COLOURS).		II. Warning and signalling colours which suggest something unpleasant to an enemy, or aid in the escape of other individuals of the same species (SEMATIC COLOURS).	III. Colours displayed in courtship (EPIGAMIC COLOURS). Ex.—*Bright colours of male birds.*
A. Colours which conceal an animal by causing it to resemble some part of its normal surroundings (protective and aggressive resemblance: CRYPTIC COLOURS).	B. False warning and signalling colours deceptively suggesting something unpleasant to enemies or attractive to prey (protective and aggressive mimicry and alluring colours: PSEUDOSEMATIC COLOURS).		
1. Concealment as a defence against enemies (protective resemblance: PROCRYPTIC COLOURS). Ex.—*Colours by which palatable insects are concealed* (see arts. Butterfly and Caterpillar).	1. Colours which deceptively suggest something unpleasant or dangerous to an enemy (protective mimicry: PSEUDAPOSEMATIC COLOURS). Ex.—*Hornet-like moth, snake-like caterpillar.*	1. Colours which warn an enemy off by denoting something unpleasant or dangerous (warning colours: APOSEMATIC COLOURS). Ex.—*Gaudy colours of nauseous or dangerous insects.*	
2. Concealment enabling an enemy to catch its prey (aggressive resemblance: ANTICRYPTIC COLOURS). Ex.—*Colours of tiger, lion, &c.*	2. Colours which deceptively suggest something attractive to prey, or enable an enemy to approach without exciting suspicion (alluring colours and aggressive mimicry: PSEUDEPISEMATIC COLOURS). Ex.—*Mantis (Hymenopus), which attracts the other insects on which it feeds by resembling a pink flower, Volucella.*	2. Colours which enable individuals of the same species quickly to recognise and follow each other (recognition marks: EPISEMATIC COLOURS). Ex.—*White tail of rabbit.*	

when alarmed. It is of great interest to trace the relation of mimicry to the other uses of colour in animals. This relationship is shown in the above table. The difference between mimicry and protective resemblance (with which it is often confused) will be seen when A is compared with B.

The term mimicry has been criticised as seeming to imply conscious volition on the part of the imitator. Such a misapprehension is unlikely to arise in any one who has read the literature of the subject. Authorities are agreed that the resemblance has been gradually produced by the operation of natural selection which has ensured the persistence of all variations tending in the direction of some well-defended insect avoided by foes.

See H. W. Bates, 'Butterflies of the Amazon' (*Trans. Linn. Soc.*, xxiii.); A. R. Wallace, 'Malayan Butterflies' (*Trans. Linn. Soc.*, xxv.), *Essays on Natural Selection, Tropical Nature, Darwinism*; R. Trimen, 'South African Butterflies' (*Trans. Linn. Soc.*, xxvi.); Belt, 'Naturalist in Nicaragua;' Poulton, 'Colours and Markings of Insects' (*Proc. Zool. Soc.*, 1887), *Colours of Animals* (Inter. Sc. Series).

Mimoseæ, a sub-order of Leguminosæ, distinguished by regular flowers and petals valvate in bud. Over 1500 species are known, all natives of warm climates, a few only extending beyond sub-tropical regions in the southern hemisphere. The genera Acacia (q.v.) and Mimosa are the best known. To the latter genus belong the Sensitive Plant (q.v.), also a great variety of trees usually of beautiful foliage (though their leaves, as in Acacias, may be reduced to phyllodia) and often also of valuable timber. The fruits are often esteemed, but the roots and seeds not unfrequently possess drastic or even poisonous properties. They are also rich in tannin and gums.

Mimulus maculosus—var. Arlequin.

Mim'ulus, a genus of plants of the natural order Scrophulariaceæ, having a prismatic 5-toothed calyx, a somewhat bell-shaped corolla, of which the

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upper lip is bifid and the lower lip trifid, two long and two short stamens, and a stigma of two lamellæ, which close together upon irritation. The species are mostly herbaceous plants, natives of America. Some of them are very frequent in flower-gardens, and many fine varieties have resulted from cultivation. They sometimes receive the name of *Monkey-flower*. One species, *M. luteus*, a native of Peru and Chili, and there used as a potherb, has become naturalised in many parts of Britain. The little yellow-flowered Musk Plant, now so common in gardens and on window-sills in Britain, is *M. moschatus*, a native of Oregon and other north-western parts of America.

Mina, a Greek weight and money of account, the sixtieth part of a Talent (q.v.), containing 100 Drachmæ (q.v.).

Mina Bird. See MYNA.

Minæans. See SABÆANS.

Minaret, Minar, a tall turret used in Saracenic architecture. It contains a staircase, and is divided into several stories, with balconies from which the muezzins summon the Mohammedans to prayer—bells not being permitted in their religion—and is terminated with a spire or ornamental finial. The minarets are amongst the most beautiful features of Mohammedan architecture, and are an invariable accompaniment of the Mosques (q.v.). For an illustration, see ARABIAN ARCHITECTURE. In India *Minars*, or pillars of victory, are frequently erected in connection with mosques; some of these are lofty and splendid monuments, that of Kutab, at Old Delhi (q.v.), being 47 feet in diameter at the base and 238 feet high. The form of the minaret was derived from the Pharos (q.v.), the ancient lighthouse of Alexandria; and the name is from the Arabic *manárat*, 'a light-house.'

Minas, capital of a wild, mountainous province (area, 4844 sq. m.; pop. 23,000) of the same name in southern Uruguay, 75 miles by rail NE. of Montevideo. Pop. 7000.

Minas Geraes, the most populous state of Brazil, lies inland from Espirito Santo and south of Bahia, and has an area of 222,160 sq. m. Pop. (1888) 3,018,807. Lying wholly in the tableland, its surface is occupied with grass and bush-covered *campos*, rising, however, in the Serra do Espinhaco to 5900 feet. The principal rivers include the navigable São Francisco and the Rio Grande, which unites with the Paranahyba to form the Paraná. Agriculture and stock-raising are the chief industries. Some gold is still obtained, and diamonds, iron, and lead are mined. The inhabitants include very few whites; among the Indians the Botocudos (q.v.) are met with.

Mince-pies, an important item of English Christmas fare, composed of very numerous ingredients (suet, raisins, apples, lemons, currants, figs, almonds, flavoured with nutmeg, cinnamon, ginger, &c.) variously compounded and baked in pastry. Formerly mutton or neat's-tongue was an essential ingredient. The shape of the crust was not originally round, but is said to have been intended to represent the manger in which the Holy Child was laid.

Minch, the channel separating the island of Lewes from the mainland of Scotland. It is 24 to 40 miles wide, and has a rapid current. The *Little Minch*, separating Skye from North Uist and the neighbouring islands in the Outer Hebrides, is 14 to 20 miles wide.

Minchinhampton, a market-town of Gloucestershire, 3½ miles SSE. of Stroud. James Bradley is buried in the churchyard. Pop. of parish, 4561.

Mincio, a tributary of the Po, rises in south Tyrol, and flows as the Sarca 80 miles to Lake Garda, from which it issues as the Mincio, and after a southerly course of 93 miles past Mantua joins the Po from the left. It forms an integral part of the Quadrilateral (q.v.) or system of fortification defending North Italy, and has had several great battles fought in its vicinity, as Castiglione (1796), Solferino (1859), Custozza (1849 and 1866).

Mind. See PSYCHOLOGY.

Mindanao. See PHILIPPINE ISLANDS.

Minden, a Prussian town in Westphalia, on the Weser, 40 miles W. of Hanover. Till 1873 a fortress of the second class, it was already a town in Charlemagne's day, and suffered much in the Thirty Years' War, and again in the Seven Years' War, when, on 1st August 1759, the French were defeated here by an Anglo-Hanoverian army under Ferdinand of Brunswick and Lord George Sackville. It has a fine new bridge (1874), a Gothic town-hall, a Catholic church (till 1811 cathedral), built between the 11th century and 1379, and restored in 1864–85, manufactures of tobacco, beer, brandy, glass, &c., and a considerable river trade. Pop. (1885) 18,592. See also MÜNDEN.

Mindere'rus Spirit, or SOLUTION OF ACETATE OF AMMONIA, is a valuable diaphoretic, much used in febrile diseases. It is prepared by adding ammonia or the carbonate of ammonia to acetic acid till a neutral liquid is obtained. It is sometimes applied hot on flannel in cases of mumps, while it has also been employed as an eyewash in chronic ophthalmia.

Mine. See MINING, MINES (MILITARY).

Minehead, a watering-place of Somersetshire, on the Bristol Channel, 25 miles NW. of Taunton. Till 1832 it was a parliamentary borough. Pop. of parish, 1774.

Mineral Kingdom, the inorganic portion of nature. Under this term, however, are not included the inorganic products of organic beings, as sugar, resins, &c., although substances more remotely of vegetable or even animal origin are reckoned among minerals, as naphtha, bitumen, asphalt, &c. To the mineral kingdom belong liquid and gaseous, as well as solid substances; water, atmospheric air, &c. are included in it. All the chemical elements are found in the mineral kingdom, from which vegetable and animal organisms derive them; but many of the compounds which exist in nature belong entirely to the vegetable and animal kingdoms, and are produced by the wonderful chemistry of life.

Mineralogy, the science which treats of minerals, does not embrace all that relates to the mineral kingdom. *Simple minerals* alone, or homogeneous mineral substances, are regarded as the subjects of mineralogy; rocks formed by the aggregation of simple minerals, and their relations to each other, are the subjects of Geology (q.v.). This limitation of the term mineralogy is comparatively recent. Geology or geognosy was formerly included in it. The arrangement and description of simple minerals according to their external characters has been called by Werner and others *Oryctognosy*, but the term has fortunately fallen into disuse. Nor is the study of mere external characters sufficient in mineralogy. The chemical composition of minerals equally demands attention. In the classification of minerals some mineralogists, as Mohs and Jameson, have regarded only the external characters, and some, as Berzelius, only the chemical composition; but the results have been unsatisfactory, and the present tendency is in favour of a system which seeks

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to constitute natural groups by having regard to both.

Some minerals being of great use, and others highly valued for their beauty, have received much attention from the earliest ages. But the ancient naturalists describe few minerals. The first attempt at scientific mineralogy was by George Agricola in the 16th century. The systems of the Swedes Wallerius and Cronstedt, in the later half of the 18th century, were the first worthy of the name. That of Werner followed, and was extensively adopted. The discoveries of Hauy in crystallography, and the progress of chemistry, gave mineralogy a new character; and then sprang up two schools of mineralogists, one resting chiefly on external characters, and the other on chemical composition.

The chemical classification of minerals is rendered difficult by the endless variety of combination and proportion in the elements of which they are composed, the presence of substances not essential to the mineral, and yet more or less affecting its characters, and the frequent impossibility of determining what is to be deemed essential and what accidental. Chemical purity is almost never found in nature. Even the purest diamond, when burned, leaves some traces of ash; and the various colours of diamond, quartz, and other minerals are due to the presence of substances which are often in so small quantity as not to affect their crystalline forms or other physical properties. Again, some minerals of identical chemical composition differ in their crystallisation, so that an arrangement founded upon it would separate them too widely. There are also many minerals which are often found in an uncrystallised state, and others which are always so. In the arrangement of minerals into natural groups, their chemical composition, although not alone to be regarded, is of the first importance, so that the place of a new mineral in the system can never be determined without analysis; and in determining the nature of a mineral chemical tests, such as the application of acids, are continually resorted to. It is also necessary to know its specific gravity, and how it is acted upon both by a moderate heat and by the blowpipe. An examination of the crystalline forms, with measurement of the angles of the crystals, is often sufficient to distinguish minerals which have otherwise much resemblance. The *cleavage* of crystals is also important—a readiness to split in planes parallel to certain of their faces only, by which the *primitive form* of the crystal may be ascertained. Minerals not crystallised exhibit important varieties of *structure*, as *laminated*, *fibrous*, *granular*, &c. Certain peculiarities of *form* are also frequently characteristic of uncrystallised minerals, as *mamillary*, *botryoidal*, &c. Minerals exhibit, when broken, very different kinds of *fracture*, as *even*, *conchoidal*, *splintery*, &c. *Opaqueness*, *translucency*, and *transparency* are more or less characteristic of different kinds: *electric* and *magnetic* properties demand attention; and very important characters are derived from *lustre*, which in some minerals is *metallic*, in others *semi-metallic*, in others *pearly*, *vitreous*, &c. *Colour* is not generally of much importance, but in some minerals it is very characteristic. The colour of the powder formed when a mineral is scratched often differs from that of the solid mass. This is the *streak* of the mineral, and is frequently very characteristic. *Hardness* and *tenacity* are very important, and are of all various degrees. *Unctuosity* and other peculiarities to be ascertained by the touch are very characteristic of some minerals, and peculiarities of *taste* and *smell* belong to others.

Mineralogy has very important relations with geology, which cannot be studied without regard to the mineral constituents of rocks. The mineral composition of soils greatly affects vegetation and agriculture. The economical uses of minerals are also very important and various. It is enough merely to allude to salt, sulphur, borax, alum, graphite, cryolite, native metals, metallic ores, &c. Naphtha, petroleum, bitumen, asphalt, &c. are of well-known utility; and a high value has always been attached to gems and other ornamental stones. There are special handbooks by Bauerman, Dana, Wöhler, Brush, and Erni. See GEOLOGY, CRYSTALLOGRAPHY.

Mineral Oil. See BAKU, NAPHTHA, PARAFFIN, PETROLEUM.

Mineral Tallow, or HATCHETTINE, a remarkable substance found in several places in Britain, Germany, Siberia, &c., soft and flexible, yellowish white, yellow, or greenish yellow, resembling wax or tallow, often flaky like spermaceti, inodorous, melting at 115° to 170° F., and composed of about 86 per cent. carbon and 14 per cent. hydrogen. The mineral is closely related to, if it be not identical with, ozokerite or native paraffin. Like other hydrocarbons, such as naphtha, petroleum, asphalt, &c., Hatchettine appears to have resulted from the chemical alteration of organic matter.

Mineral Waters, spring waters which possess qualities in relation to the animal body different from those of ordinary water, have been used as remedial agents from a very early period. The oldest Greek physicians had great faith in their curative power, and the temples erected to Æsculapius were usually in close proximity to mineral springs; the warm baths of Calirrhoe, near the Dead Sea, are mentioned by Josephus as having been tried by Herod in his sickness. We are indebted to the Romans for the discovery not only of the mineral thermic springs in Italy, but of some of the most important in other parts of Europe, amongst which may be named Aix-la-Chapelle, Baden-Baden, Bath, Spa in Belgium, and many others; and Pliny (*Natural History*) mentions a very large number of mineral springs in almost all parts of Europe (see BATH, HYDROPATHY). The therapeutic action of mineral waters or spas depends chiefly upon their chemical composition and their temperature, though other circumstances, as situation, elevation, climate, geological formation, mean temperature, &c., have an important bearing upon the success of the treatment.

The best time for undergoing a course of mineral waters is, in the majority of cases, the months of June, July, August, and September. There are, however, exceptions depending upon climate; for example, at Gastein, celebrated for its thermal springs, the weather is changeable and stormy in June and July, but pleasant in May, August, and September. Early rising is usually advisable during a course of mineral waters, and, as a general rule, the water should be drunk before breakfast, at intervals of about a quarter of an hour between each tumbler, moderate exercise being taken in the intervals. In many cases bathing is of even greater importance as a remedial agent than drinking. Baths are generally taken between breakfast and dinner, and should never be taken soon after a full meal. The time during which the patient should remain in the bath varies very much at different spas, and the directions of the local physician should be strictly attended to on this point. As a general rule, the treatment should not be protracted beyond the space of six weeks or two months, but on this point the patient must be solely guided by the physician resident at the spa. Indulgence in the pleasures of the table, and excesses of any kind, frequently counteract the salutary effects of the waters, while perfect mental

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relaxation is an important auxiliary to the treatment. Spas are only suitable for patients suffering from *chronic disorders*.

No classification of mineral waters based upon their chemical composition can be strictly exact, because many springs are, as it were, intermediate between tolerably well characterised groups. The following classification, adopted by Althans, is perhaps the most convenient: (1) Alkaline Waters; (2) Bitter Waters; (3) Muriated Waters; (4) Earthy Waters; (5) Indifferent Thermal Waters; (6) Chalybeates; (7) Sulphurous Waters.

(1) The Alkaline Waters are divisible into (*a*) *Simple Alkaline Acidulous Waters*, of which the chief contents are carbonic acid and bicarbonate of soda. The most important spas of this class are the thermal springs of Vichy and the cold springs of Fachingen, Geilnau, and Bilin. These waters are useful in certain forms of indigestion, in jaundice arising from catarrh of the hepatic ducts, in gallstones, in renal calculi and gravel, in gout, in chronic catarrh of the respiratory organs, and in abdominal plethora. Vichy (q.v.) may be taken as the representative of this class of springs. (*b*) *Muriated Alkaline Acidulous Waters*, which differ from the preceding sub-group in additionally containing a considerable quantity of chloride of sodium. The most important spas of this kind are the thermal springs of Ems, and the cold springs of Selters and Salzbrunn. They are useful in chronic catarrhal affections of the bronchial tubes, the stomach and intestines, and the larynx; while the Ems waters possess a high reputation in certain chronic diseases of the womb and adjacent organs. (*c*) *Alkaline Saline Waters*, of which the chief contents are sulphate and bicarbonate of soda, such as the warm springs of Carlsbad and the cold springs of Marienbad, serviceable to patients suffering from abdominal plethora, if unconnected with diseases of the heart or lungs. These waters, especially those of Carlsbad, afford an excellent remedy for the habitual constipation which so frequently arises from sedentary occupations.

(2) The chief contents of the Bitter Waters are the sulphates of magnesia and soda; and the best-known spas of this class are those of Sedlitz, Friedrichshall, and Kissingen; although two valuable English examples are the bitter water of Cherry Rock, near Kingswood, in Gloucestershire, and the Purton Spa, near Swindon, in Wiltshire. These waters act both as purgatives and diuretics.

(3) The Muriated Waters are divisible into (*a*) *Simple Muriated Waters*, of which the chief contents are a moderate quantity of chloride of sodium or common salt. The chief spas of this class are Wiesbaden and Baden-Baden, which are hot; those of Soden (in Nassau), of Mondorf (near Luxembourg), and of Canstatt (near Stuttgart), which are tepid; and those of Kissingen, Homburg, and Cheltenham, which are cold. The muriated saline springs of Saratoga in the United States are some of them chalybeate, others sulphurous or iodinous; all of them being rich in carbonic acid gas. The Ballston saline spring near Saratoga has a very high proportion of carbonic acid. They are chiefly employed in cases of gout, rheumatism, scrofula, and abdominal plethora. (*b*) *Muriated Lithia Waters*, of which the chief contents are the chlorides of sodium and lithium. In gout they first aggravate the pain, but then give relief; and in periodic headache they have been found serviceable. (*c*) *Brines*, whose chief contents are a large amount of chloride of sodium, such as the spas of Rehme in Westphalia and Nauheim in Hesse. They are mostly employed for bathing, and are often of much service in scrofula, anæmia, rheumatism, certain forms of paralysis, and catarrh of the mucous membranes. (*d*) *Iodo-bromated Muriated Waters*, in which, besides a moderate quantity of chloride of sodium, the iodides and bromides of sodium and magnesium are contained in an appreciable quantity. The Kreuznach waters are used both for drinking and bathing, and are of service in scrofulous infiltrations of the glands, in scrofulous ulcers, in chronic inflammation of the uterus and ovaries, &c. The waters of Hall, in Austria Proper, have a high reputation in cases of bronchocele or goitre.

(4) Earthy Waters, of which the chief contents are sulphate and carbonate of lime, as at Wildungen, Leuk, Bath, Lucca, and Pisa. The Wildungen water is 'a capital diuretic, and not only promotes the elimination of gravel and renal calculi, but, by its tonic action on the mucous membrane of the urinary passages, serves to prevent the formation of fresh concretions. It is also much used for chronic catarrh of the bladder, neuralgia of the urethra and neck of the bladder, dysuria, and incontinence of urine.' The baths of Leuk, in which many patients remain nine hours daily (viz. from 4 A.M. to 10 A.M., and from 2 P.M. to 5 P.M.), until an eruption appears, are chiefly used in chronic skin diseases. The waters of Bath, Pisa, and Lucca, which are thermal, are useful in chronic skin diseases, gout, rheumatism, &c.

(5) Indifferent Thermal Waters, which usually contain a small amount of saline constituents. Of the spas of this class the most important are Gastein (95° to 118°), Teplitz (120°), Wildbad (96°), Warmbrunn (100°), Clifton (86°), and Buxton (82°). Their most striking effects are to stimulate the skin and excite the nervous system. 'They are especially used in chronic rheumatism and atonic gout; in diseases of the skin, such as prurigo, psoriasis, lichen; in neuralgia and paralysis due to rheumatic and gouty exudations, to parturition, or to severe diseases, such as typhoid fever and diphtheria; in hysteria; and in general weakness and marasmus.'

(6) Chalybeate Waters, which are divisible into (*a*) *Simple Acidulous Chalybeates*, whose chief contents are carbonic acid and bicarbonate of protoxide of iron; and (*b*) *Saline Acidulous Chalybeates*, whose chief contents are sulphate of soda and bicarbonate of protoxide of iron. The quantity of iron present is very small—from ·08 to ·15 in 1000 parts. Many of the chalybeate springs, especially in Germany, contain also much carbonic acid; carbonate, sulphate, and chloride of sodium is frequently present, and may help in the cure. Harrogate, Rippoldsau, Homburg, and the Putnam Spring at Saratoga are examples of chalybeate wells which are very seldom thermal. Strathpeffer has both chalybeate and sulphurous springs. Chalybeate waters are valuable in anæmia, enlargement of the spleen, and many female disorders.

(7) Sulphurous Waters, which contain sulphuretted hydrogen or metallic sulphides (sulphurets), or both. The most important sulphurous thermals are those of Aix-la-Chapelle, Baden (near Vienna), Barèges, Eaux-Chaudes, and Bagnères de Luchon; whilst amongst the cold sulphurous springs those of Nenndorf (in Hesse-Nassau) and Harrogate are of great importance. They are extensively used in chronic diseases of the skin, and are of service in many cases in which exudations require to be absorbed, as in swellings of the joints, in old gunshot wounds, and in chronic gout and rheumatism. In chronic laryngeal and bronchial catarrh they frequently give relief, and in chronic poisoning by lead or mercury they favour the elimination of the poison, although to a far less degree than iodide of potassium taken internally. The sulphurous waters are employed externally and internally, and mineral mud-baths are believed by many physicians to form a valuable auxiliary to this treatment.

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See Althans, *Spas of Europe* (1862); Glover, *Mineral Waters* (1857); Tichbourne and Prosser James, *Mineral Waters of Europe* (1883); Bradshaw's *Dictionary of Mineral Waters* (new ed. 1886); Walton, *The Mineral Waters of the United States and Canada* (1875); German works by Herschfeld and Pichler (1875-76), Lehmann (1877), Flechsig (1882); and the works cited at HEALTH-RESORTS.

Minerva, the name of a Roman goddess, identified by the later Græcising Romans with the Greek Athena (q.v.). Her name is thought to spring from the same root as *mens* ('mind'); and the ancient Latin scholar and critic, Varro, regarded her as the impersonation of divine thought —the plan of the material universe of which Jupiter was the creator and Juno the representative. Hence all that goes on among men, all that constitutes the development of human destiny—itself but the expression of the divine idea or intention —is under her care. She is the patroness of arts and trades, and was invoked alike by poets, painters, teachers, physicians, and all kinds of craftsmen. She also guides heroes in war; and, in fact, every wise idea, every bold act, and every useful design owes something to the high inspiration of this virgin goddess. Her oldest temple at Rome was that on the Capitol, but she had another on the Aventine. Her festival was held in March, and lasted five days, from the 19th to the 23d inclusive.

Minerva-press, the name of a printing-office in Leadenhall Street, London, from which issued in the later part of the 18th and the earlier part of the 19th century a long series of highly sentimental novels, with remarkably intricate plots and an ample measure of tribulation and tears before the happy denouement was reached. These were gradually laughed out of existence as a taste for more humane and healthy fiction spread over England.

Minervino, an agricultural town of Southern Italy, 44 miles W. of Bari. Pop. 14,972.

Mines, MILITARY, are underground passages by means of which explosives are lodged in such a position as to destroy the enemy's works or to gain cover for lodgments from which the besieger may continue his advance. They are generally but a few feet below the surface, never driven through rock for any distance, and require lining with wooden *cases.*

Before the invention of gunpowder, mines were constantly used to effect an entrance into a besieged place or to breach its walls by underpinning them with timber, which was then set on fire. By means of them Alexander the Great breached the walls of Gaza. Cæsar found the Gauls skilled in their use, and even able to arrest the progress of his own miners. Powder mines began to be largely used early in the 16th century. At the siege of Padua in 1509 the breaches were ruined and the mines exploded under the feet of the storming parties. *Countermines,* too, behind the walls near their base, and then long galleries from them under the ditch with transversals and listeners were added to the permanent fortifications of the 17th century. These enabled the besieged to ascertain the direction of the besiegers' mining approach and to destroy his galleries by timely explosions. Thus at the siege of Candia by the Turks, which lasted two years and a half (1667-69), more than 1300 mines were exploded by one side or the other. Systems of countermines became very elaborate during the 18th century, radiating from the salients sometimes in several tiers; the length of the galleries for a single front in some cases amounted to 3 miles or more. Modern systems are perhaps less elaborate, but their importance is fully recognised.

When the besieger can no longer advance by surface approaches he has recourse to mining, sinking a vertical *shaft* (4′ × 2′ inside measurement) or an *inclined gallery* (6′ 8″ × 6′ 6″ or 4′ 10″ × 2′), generally from the third parallel, and from it working his way forwards. *Branch-galleries* (3′ 6″ × 2′) are broken out wherever necessary, and specially constructed *frames* fitted throughout as the work progresses. In such a confined space only very small tools can be used, and only one man can work at the head of a gallery at one time, doing about 12 inches an hour. Small trucks and bellows, or other ventilating appliances, are also necessary. At the head of the gallery a chamber is constructed to hold the charge, which is then *tamped*—that is to say, the gallery in rear is filled with earth, for a distance greater than the length of the *line of least resistance,* or distance to the nearest surface, and fired by electricity, powder hose, or Beckford's fuse. If the circular opening made by the explosion has a diameter equal to the line of least resistance it is called a *one-lined crater;* if double that line, a *two-lined crater,* and so on. Mines producing *two-lined craters* are called *common mines;* those so lightly charged as to produce no craters are called *camouflets.* The latter are used by the defender to destroy the assailant's mines without forming craters which he might utilise as lodgments. Gunpowder is preferred to other explosives if the gallery is to be used again, as the fumes are not so noxious.

Mining tactics require very great coolness, judgment, and resolution, especially on the part of the besieged. He must from his listening galleries estimate the distance of the enemy and avoid exploding his countermines too soon or he will only injure his own galleries. If he ceases to hear the miner's truck running in the enemy's gallery he will know that tamping has commenced and that, if within range, the time has come to explode his *camouflet.* The defender is restricted to small charges for fear of making craters, unless his countermine galleries are very deep, while the besieger can advantageously use very large ones. Thus the former may be said to fight with a short-range weapon against an adversary using one which is effective at a greater distance. The chief point in his favour is that he can prepare beforehand a network of galleries, and by using boring tools he can place charges some distance in advance of their heads; but the besieger will ascertain their disposition and extent by means of plans or spies, and will place heavily charged mines on a line as nearly as possible parallel to the ends of the countermines, but not nearer than 14 yards, the distance at which work is audible to the enemy. These are fired and lodgments formed in their craters from which the same tactics are repeated; the countermines when broken into are occupied, and thus ground is gradually gained, and the defender driven back step by step until the counterscarp is reached. This wall is broken through by a mine, the ditch crossed, the breach reached and occupied. Under the breach the defender will have placed mines which he will spring at the moment of assault.

Somewhat akin to these latter are the *ground torpedoes* placed in front of a work close under the surface of the ground over which the enemy must pass to the assault, and fired by the pressure of his weight upon them. These are chiefly of use against savages, and were largely employed by General Gordon in the defence of Khartoum.

Another similar form of defence called a *fougasse* is an excavation in the form of the frustrum of a cone with its axis inclined at about 40° with the horizon. The charge is placed in a recess at the bottom, covered with a strong wooden

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platform on which rough stones, bricks, or shells are placed. On being fired these are projected forward and cover a large surface of the ground in front. Eighty pounds of powder would throw 5 tons of bricks and stones over a space 160 yards long and 120 broad. A *shell fougasse* is simply a box buried in the ground, the lower part filled with powder and the upper with shells. It is generally self-exploding, like the ground torpedo.

Submarine mines are charges of explosive material (usually gun-cotton or dynamite) sunk in rivers, estuaries, or roadsteads to prevent the passage of hostile ships. They are either *observation* mines, fired by electricity from an observing station; *controlled* electro-contact mines, fired by the defender when a vessel striking them gives notice of its being over them; *uncontrolled* mines, mechanical, electro-mechanical, or chemical, which are exploded when struck with adequate force by friend or foe; or *dormant* mines, which, sunk at first, can at any time be caused to rise and obstruct the passage.

Submarine mines are usually placed chequerwise in several rows and groups and often at varying depths. Observation mines cannot be relied upon at greater distances than one sea mile in foggy weather, and at night must be watched by electric search-lights. With contact mines there is the danger of friendly ships mistaking the channel. All mine fields must be defended by heavy guns placed in batteries secure against landing parties, otherwise the enemy's boats will creep for the mines or clear a passage through them by exploding countermines. It is so difficult to arrange a system of mines which will not interfere with the passage of friendly ships and yet can be relied upon to prevent that of an enemy's vessels at all times and in all weathers, however disguised, that they are only unobjectionable when used for the absolute closing of comparatively narrow channels to all traffic.

Some sea-forts have torpedo passages from which Whitehead fish torpedoes and similar projectiles can be discharged; but these can hardly be classed as submarine mines.

Minghetti, MARCO, Cavour's most distinguished disciple and successor as leader of the Italian Right, was born 8th September 1818 of a commercial family in Bologna, and supplemented a brilliant course at its university by a prolonged tour in France, Germany, and Great Britain. Free trade as vindicated by Richard Cobden found him prepared for its acceptance, by familiarity with the teaching of its Tuscan anticipator Bandini. With the election in 1846 of Pope Pius IX. young Italy's aspirations for national unity and constitutional government seemed nearing their fruition, and Minghetti started a journal in aid of his country's regeneration. He enjoyed Pio Nono's favour, and was made member of the 'Consulta della Finanze' and minister of Public Works. But under the pressure of Austria, backed by Radetsky's forces, the pope's reforming zeal was short-lived, and Minghetti, like others of his school, abjured the papal government and enrolled in the Sardinia army to fight for his country's cause under King Charles Albert. He served with distinction in the Lombard campaign; was promoted captain, then major; and on the field of Custoza earned the cross of the Knights of St Maurizio. After the fatal defeat at Novara he settled at Turin, an ardent student of economics and devoted friend of Cavour, whose confidences he shared during the diplomatic meetings at Paris which preceded the Crimean war, the war of 1859, and the expulsion of Austria from Lombardy. In the eventful years 1859–60 he was Cavour's secretary for foreign affairs, till he resigned with his chief over the treaty of Villafranca. His next post was that of minister of the Interior, and on Cavour's death in June 1861 he was regarded as his ablest representative in the Italian chamber. In 1863 he became prime-minister, in 1864 he concluded with the Emperor Napoleon the 'September Convention.' In 1868 he was Italian minister in London, and thereafter minister of Agriculture. In 1870 the collapse of the Second Empire brought with it the dissolution of the September Convention, and Rome became the capital of Italy and seat of government. From 1873 to 1876 Minghetti was prime-minister for the second time, and among many useful measures earned his country's gratitude by effecting the 'paraggio' or financial equilibrium between her outlay and income. For the next ten years Minghetti was still the most prominent member of the Italian parliament. His lectures and essays on Raphael and Dante illustrate on the æsthetic side a catholicity of culture which in the sphere of practical politics can point to his treatises on *Economia Publica* (1859) and *La Chiesa e lo Stato* (1878). He died in Rome, 10th December 1886. See his *Miei Ricordi* (Turin, 1888).

Mingrelia. See GEORGIA, CAUCASUS.

Minho (Span. *Miño*, anc. *Minius*), a river of Spain and Portugal, rises in the north-east of Galicia, flows south-west through the Spanish provinces of Lugo and Orense, and, after forming the boundary between Portugal and Spain, falls into the Atlantic Ocean. Its total length is 174 miles, and it is navigable for small craft 25 miles above its mouth; a bar at the entrance prevents the passage of large vessels. Area of basin, 157,000 sq. m. Its chief tributary is the Sil, which joins it from the left.

Miniature-painting, or the painting of portraits on a small scale, originated in the practice of embellishing manuscript books (see ILLUMINATION OF MANUSCRIPTS). As the initial letters were written with red lead (Lat. *minium*), the art of illumination was expressed by the Low Latin verb *miniare*, and the term *miniatura* was applied to the small pictures introduced. After the invention of printing and engraving this delicate art entered on a new phase; copies in small dimensions of celebrated pictures came to be in considerable request, and, in particular, there arose such a demand for miniature-portraits that a miniature in popular language came to signify 'a very small portrait.' Soon after their introduction miniature-portraits were executed with very great skill in England. Holbein (*c.* 1495–1543) painted exquisite miniatures, and having settled in London, his works had great influence in calling forth native talent. The works of Nicholas Hilliard (born at Exeter 1547, died 1619) are justly held in high estimation. Isaac Oliver (1556–1617) was employed by Queen Elizabeth and most of the distinguished characters of the time; his works are remarkable for careful and elaborate execution; and his son, Peter Oliver (1601–47), achieved even a higher reputation. Thomas Flatman (1637–88) painted good miniatures. Samuel Cooper (born at London 1609, died 1672), who was with his brother Alexander a pupil of his uncle, John Hoskins, an artist of reputation (died 1664), carried miniature-painting to high excellence. Cromwell and Milton sat to him; he was employed by Charles II., and obtained the highest patronage at the courts of France and in Holland. Jean Petitot (1607–91) was the first to bring to perfection the art of enamelling as applied to portraiture. There are as many as fifty-eight examples of this great artist in the Jones Collection at the South Kensington Museum. Richard Cosway (1740–1821) was one of the most famous miniaturists of the 18th century.

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Robert Thorburn (1818–85) first made his name as a miniaturist, and many others might be mentioned; but the last famous miniature-painter was Sir William Ross (1794–1860), who lived to see his art superseded by photography. The number of his miniatures in existence is said to number over 2200. Of late years public interest in the work of the miniaturist has revived, and several exhibitions of miniatures have been held. Prices have advanced, and it is extremely difficult to obtain good examples. The works of Cosway are especially sought after. Photography may be said to have killed the art, although miniatures have continued to be painted; but enthusiasts hope from the interest now taken in historical specimens that the art may yet be revived. As to technical details, the early artists painted on vellum and used body-colours—i.e. colours mixed with white or other opaque pigments, and this practice was continued till a comparatively late period, when thin leaves of ivory fixed on card-board with gum were substituted. Many of the old miniature-painters worked with oil-colours on small plates of copper or silver. After ivory was substituted for vellum transparent colours were employed on faces, hands, and other delicate portions of the picture, the opaque colours being only used in draperies and the like; but during the 19th century, in which the art has been brought to the highest excellence, the practice has been to execute the entire work with the exception of the high lights in white drapery with transparent colours.

See Walpole's *Anecdotes; Catalogue of Miniatures exhibited at South Kensington* (1865); Russell, *Art of Miniature* (4th ed. 1870); Wagner, *Miniature Painting* (Philadelphia, 1876); Foster, 'Some Miniature Painters,' in *Antiquary* (vols. xiii.-xiv.); J. W. Bradley, *Dictionary of Miniaturists* (3 vols. 1888–89); and J. L. Propert, *History of Miniature Art* (1889).

Minié, CLAUDE ÉTIENNE, inventor of the Minié rifle, was born in Paris in 1814, enlisted in the army as a private soldier, and quitted it as colonel in 1858. He devoted his principal thought to the perfecting of firearms, and in 1849 invented the Minié rifle (see RIFLE). In 1858 the khedive of Egypt appointed him director of a small-arms factory and musketry school in Cairo. He died in 1879.

Minims (*Fratres Minimi*, 'Least Brethren'—so called, in token of still greater humility, by contrast with the *Fratres Minores* or Lesser Brethren of St Francis of Assisi), an order of the Roman Catholic Church, founded by another St Francis, a native of Paula, a small town of Calabria, about the middle of the 15th century. See FRANCESCO DI PAULA.

Mining. The art of mining comprehends all the processes whereby the useful minerals are obtained from their natural localities beneath the surface of the earth, and the subsequent operations by which many of them must be prepared for the purposes of the metallurgist. The art has been practised from the remotest times. It is referred to in the 28th chapter of the Book of Job; and an Egyptian papyrus, drawn in 1400 B.C., preserved in the museum at Turin, depicts the workings of a gold-mine. The first writer who treated mining systematically was Georgius Agricola. In 1556 he published in Latin an exhaustive treatise on the subject. The introduction of gunpowder as a blasting-agent in 1620 completely changed the conditions under which mining had up to that time been carried on, and the enlarged scale on which mining operations are now conducted has led to the invention of new methods of working, and to the introduction of machines of greater precision and power.

All mineral deposits are divided into two very broad divisions. The first includes the beds or seams of iron ore, coal, and salt. These are deposits laid out more or less horizontally and parallel to the stratification of the surrounding rocks. The second class includes mineral veins or lodes (see ORE-DEPOSITS). Various names have been given to these deposits. In the British colonies, for example, they are termed *reefs* (see GOLD), a somewhat misleading name. A lode may be defined as a repository of mineral matter which fills more or less completely a former fissure in the earth's surface.

The mining appliances employed are very different in the two classes of deposits. In the first class, it is desirable to make a hole of the shortest possible depth from the surface of the ground to the bed of mineral. A shaft is therefore sunk through valueless beds until the mineral is reached. Machinery of the best class is then used to extract the whole of the mineral, due precautions being taken to avoid danger from falls of roof and from noxious gases. In the second class of deposits, the inclination of the mineral vein has to be taken into account, as the deposit varies considerably in inclination and in size. The vein must therefore be studied foot by foot, downwards from the top. The miner does not look favourably on vertical veins. Certainly in most cases it would appear that the chance of vertical lodes being productive is much less than in inclined ones. In some cases a vertical shaft is sunk, and passages, known as *cross-cuts*, are driven from this to the vein at different levels. A vertical shaft presents the advantages of greater ease in sinking, hauling, and pumping. At the Comstock lode, in Nevada, thousands of pounds were wasted in sinking a perpendicular shaft, the advantages of which were urged with considerable plausibility. A deep shaft may cost from £10,000 to £50,000. In the case of an inclined shaft the ore obtained from the shaft itself enables some of the charges to be recouped. In a well-known Cornish copper-mine, Tresevean, after an inclined shaft had been used for many years, a new shaft, 1800 feet in depth, was sunk at a cost of £20,000; but success had already been assured before this great outlay was contemplated. The best arrangement for an extensive mine is to have a main vertical shaft and several secondary inclined ones. With inclined shafts it is out of the question to put in the highly-perfected engines used at collieries, the object being not the removal as quickly as possible of large quantities of material, but the exploration of the vein by slow and careful degrees at many points and with a moderate number of men.

In searching or prospecting for mineral deposits large sums of money are spent, sometimes in vain. The surface of the rock is usually covered by deposits of sand and gravel, vegetable matter, vegetation, and, in some cases, peat bogs. In consequence, many notable mines have been discovered by accident. Thus, the observation of the pellets picked up by birds led to the discovery of veins of gold ore in Lower Hungary. The famous silver-mines of Potosi are said to have been discovered by an Indian who, taking hold of a bush to prevent his falling, pulled it up by the roots and thereby disclosed glittering masses of native silver. Again, gold was discovered in California by James W. Marshall, in 1848, while cutting a small mill-race. In ancient times the search for mineral deposits was based on the indications given by the Divining-rod (q.v.); and there still exist intelligent miners who believe in this curious myth.

In the search for mineral deposits, the best evidence is obtained by putting down bore-holes. These are made by various methods, and are put down to a depth of a few feet when required for

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testing the character of the foundation subsoil, or, in other cases, to thousands of feet when required in seeking for or estimating the value of deposits of coal, salt, and ironstone. Ages ago bore-holes were put down by the Chinese to a depth of 3000 feet. Recently, in Europe and America, depths of 2000 feet have not unfrequently been attained. At Schladebach, near Merseburg, the deepest bore-hole in the world has been put down by the Prussian government in search of coal. The sinking occupied several years (1880–86), and the depth attained amounted to 5834 feet.

Bore-holes may be made by a circular borer moved by a lever. The rods are of iron, with square heads, and are turned by a cross-head worked by a couple of men. In this way an auger-like cutting action is effected. With harder rock it is usual to advance by means of percussion. A chisel-headed tool is employed, which cuts holes of 3 to 4 inches in diameter. At each stroke the bore-master causes the tool to turn slightly. When sufficient debris has accumulated the rods are withdrawn, and an instrument put down to extract the powdered material and water. With a length of rods amounting to 400 to 500 feet the weight is enormous, and, in consequence of the concussion, difficulties arise. Men are not sufficient to raise the load. In some cases a lever is used to raise the rods a few inches or feet, and to let them fall suddenly. In other cases the rods are replaced by a rope. This, however, from being wet and dry alternately, is apt to snap suddenly, and the rods remaining in the hole are difficult to recover. The rods, too, may get twisted or the nature of the iron itself be altered by the vibration. In putting down a bore-hole, a tower or shears is erected over the hole. By making this 60 to 70 feet high, the rods may be extracted in lengths of 60 feet, and thus the 6 to 8 hours a day usually spent in unscrewing the rods are saved. In some cases it is necessary to tube or line the whole bore-hole. See BORING.

The Chinese method of boring with ropes has been imitated in Europe with great economy, but with great liability to fracture and consequent loss. This has been done by Messrs Mather & Platt of Salford, who employ a chisel-bit with circular sides so as to keep the bore-hole true. This is raised and allowed to fall a few inches or feet, according to the nature of the ground. It is attached to a weighty mass of iron with rings serving as guides. The whole mass is suspended by a flat hempen rope. This rope passes over a pulley to a drum on which a mass of rope can be accumulated. The pulley is attached to the piston-rod of a steam-engine. The action of the steam behind the piston lifts the pulley, and consequently the tool, the rope being clamped. The steam then causes the tool to fall, and on falling it automatically turns. A cylindrical tool can easily be inserted, and a core obtained that shows the nature of the rock and its inclination. At the Paris Exhibition of 1862 a proposal was made to drill with a tube in which diamonds were fixed. This was merely intended for use on a small scale; but it was soon applied to deep bore-holes. For this drill black diamond is employed, a substance with the full hardness of the ordinary diamond and a certain amount of toughness. Though very expensive, this method of boring is found advantageous when great speed is required. The fall of rock in bore-holes is apt to cause serious interruption on account of the jamming of the rods. The sudden strain given to release them is liable to cause fracture, besides which the full work is not done by the rods. This difficulty is obviated in several ways, notably by replacing the iron rods by wooden ones, 30 to 32 feet long, with iron connections. The free-falling cutter proposed by Kind and the hollow rods of Von Oeynhausen may be instanced as having rendered good service in the execution of great works.

In order to open up a mine, tunnels or adit-levels are driven on the lode or to cut it whenever the contour of the country allows it. Shaft-sinking involves a larger outlay of capital and greater working costs. In the ordinary method of sinking shafts, the workmen standing upon the bottom of the pit blast out the rock, and send the excavated material to the surface by means of an engine, rope, and bucket. The sides of the shaft are supported by timbering or walling. In water-bearing strata many difficulties are encountered. Brunel, the father of the great engineer, proposed to obviate these by employing a circular frame with a cutting ring. On this, with hydraulic mortar, a wall was built and held firmly together by ties. In a second method, largely used in modern collieries, beams of cast-iron are employed, and 10,000 to 20,000 wooden wedges driven in, a succession of cast-iron segments or rings, known as *tubbing*, being built in. The shaft is thus sunk and the water pumped out. Tubbing a shaft is a very difficult operation, and the method has frequently been known to fail after £20,000 to £30,000 has been spent. In order to get over the difficulties and dangers, Kind, a German engineer, thought of sinking a bore-hole with sufficiently large tools consisting of solid masses of iron with sharp steel teeth. The shaft having been bored, rings of cast-iron could, he thought, be fixed in and the water pumped out. This was tried in 1840 in a very difficult case and was found impracticable, and not until 1860, when Chaudron, an eminent Belgian, took the matter in hand, was the method successful. A watertight bottom was made, half a dozen workmen at the surface doing all the work. The method has been employed in the United Kingdom in a few instances. One remarkable case may be mentioned. At the mouth of the Tyne are coal-measures of great value, and at South Shields attempts were made to work the coal under the sea. Difficulty, however, was caused by a band of magnesian limestone highly charged with water. The enterprise promised to be very costly. Tubbing was totally unsuccessful, notwithstanding the fact that enormous pumps were employed raising as much as 11,000 gallons of water per minute. The shaft was 14 feet in diameter, and if the pumping ceased the water rose in the shaft 12 feet in two minutes. Recourse was then had to the Kind-Chaudron method, which had previously been successfully tried on the Continent. The *trépan* or cutter of the boring tool was 3 or 4 feet in diameter, and the hole was bored to a certain depth. A larger cutter was then used. In this way the sides were formed into inclined planes, so that the fragments rolled into a suspended bucket in the smaller hole, the bucket being raised from time to time. When a place was reached where a watertight joint could be made, Chaudron's tubbing was applied and the shaft successfully completed. In this tubbing the bottom ring has a sliding case in which is placed a quantity of moss, which, when the whole length of tubbing comes to rest on the watertight bed cut for it under water by the borer, packs together and forms a tight joint. This method of sinking shafts is practically self-acting. It is economical and simple, and eliminates risk to human life. In ordinary shaft-sinking accidents are frequent, as a screw or a hammer falling down the yawning gulf is likely to produce a fatal injury.

An ingenious device for overcoming the difficulties of shaft-sinking was invented by a French engineer, Triger. This consists in damming back the water by employing a constant resisting force; that is to

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say, in pumping into the iron cylinder that forms the shaft such an amount of air that the pressure on the bottom from within should be equal to that from without. By means of a flooring in the cylinder, a lower air-tight compartment is formed, in which it is found that men can work under a pressure of 3½ atmospheres. In order that the men may enter or leave their working-place without disturbing the equilibrium of the forces, the principle of the canal-lock is applied, a second chamber being formed above the working one with trap-doors communicating with the shaft above and with the chamber below. One of these doors being always closed while the other is open, the excavated material can be drawn up without any appreciable loss of compressed air. This method has been successfully applied at a number of shafts on the Continent.

Another ingenious process of sinking through quicksand is that devised by H. Poetsch. This consists in freezing the water contained in that portion of the water-bearing ground which occupies the position of the intended shaft into a solid mass of ice, and then sinking through it by hand without having to pump any water. This method has proved successful at several Continental collieries and at the Chapin mine in Michigan.

The average depth of coal-mines before the introduction of the steam-engine did not exceed 100 yards, whilst a near approximation for the present time would be 400 yards. The deepest shaft in Great Britain is that of the Ashton Moss Colliery, near Manchester, which has attained a depth of 2850 feet. The seams dip at the rate of 9 inches per yard, so that parts of the workings are 3000 feet deep. The deepest shaft in the world was until recently that of a silver-lead mine in Bohemia, at Przibram, where the Adalbert shaft is 3432 feet in depth. This depth has, however, been exceeded in the Lake Superior copper-mining district, where in 1890 the Calumet shaft attained a depth of 3900 feet.

The cutting of a path through the harder rocks, as carried on by the ancient miners, was particularly laborious. The work was executed in confined spaces, and a large amount of dust was produced. The miners' vocation was excessively unhealthy, inasmuch as they were obliged to inhale large quantities of dust; they thus became subject to disorders of the lungs to which they fell victims at an early age. Previous to the introduction of blasting the implements used were of the nature of wedges and hammers. Bit by bit pieces of rock were broken away, the operation being aided by natural fissures in the rock and by the brittleness of the hard material. In this way the ancient miners cut coffin-shaped galleries 5 feet in height. At the present time the galleries or levels are usually 7½ feet high and 5 feet wide, thus affording great facility for travelling and for ventilation. The invention of gunpowder is of much greater antiquity than its application to mining purposes. In the 14th century it was largely used for musketry and cannon, and even for blowing down defences; but, curiously enough, it was not applied to mining purposes until the beginning of the 17th century, and even then made its way so slowly that it was not largely employed until the 18th century. In the operation of blasting use is made of a borer or drill of iron, or, as is more usual, of cast-steel. This is struck with a hammer. A borer of larger diameter may be used, held by one man and struck by another. Of late years mechanical rock-drills driven by steam or by compressed air have come largely into use; see BORING, with illustration. The bore-hole, when finished, is then charged. The gunpowder is enclosed in a little bag of cloth dipped in pitch and provided with a fuse. Instead of using a cartridge of this kind, clay may be forced down the hole by a claying bar so as to shut off feeders of water, and the hole will be dry enough to receive a charge of powder. A needle of iron or steel is placed in the midst of the charge with the ring at its end protruding, and tamping is introduced. For this purpose it is best to put in clay piecemeal until the whole is filled up. Accidents may happen by pushing down the iron bar, which is apt to strike fire against hard rock. A second suspected cause is that, when a man takes a tamping bar and strikes it with a hammer, the air is compressed, and the temperature augmented sufficiently to explode the powder. These disadvantages are set aside by Messrs Bickford & Smith's safety-fuse (see BLASTING). The older fuse consisted of carefully selected straws filled with fine powder. The safety-fuse is of cotton with gunpowder in the middle. For use in wet ground it is covered with a waterproof composition. Considerable attention has been paid to the subject of consolidating the charge. Excellent work has been done with compressed powder; dynamite has become quite indispensable; and gun-cotton is also employed, the best form being the compressed variety invented by Abel. Nitrated gun-cotton or tonite has also given admirable results. The fullest benefit of these modern explosives can only be obtained by the use of strong detonators fired by electricity, by which it is possible to place a number of bore-holes in such a manner that when fired simultaneously they shall help each other.

For removing coal these high explosives are too quick in their action, and blasting-powder continues to be used. Millions of tons of coal are still obtained by its aid. In order to obviate the danger of explosions in fiery collieries, many ingenious substitutes for blasting have been proposed. For example, a hole is bored, and wedges inserted to force down the coal which has previously been under-cut with the pick. Another plan of great promise is that devised by Smith and Moore, in which cartridges of caustic lime are employed, water being forced into them by a force-pump. The pressure of steam generated by the usual charge of seven cartridges is 2850 lb., the cartridges themselves expanding to about five times their original size. The efficiency of these cartridges varies with the nature of the coal, the best results having been obtained in the Derbyshire collieries.

The work of the miner engaged in under-cutting the coal-seam is very arduous, and various coal-cutting machines have been invented with a view to lessen the labour and expense. They work with compressed air or electricity, and have the cutters arranged on the periphery of a rotating disc, or on a travelling pitch-chain. Though largely employed in America, they have not yet come into extensive use in Great Britain. The coal, when broken down, is placed in wagons, and drawn by horses or engine-power to the bottom of the shaft and raised to the surface.

The actual mode of working the coal, although varying greatly in every district, may be broadly divided into (1) the post-and-stall, or bord-and-pillar, or (in Scotland) stoop-and-room, method, where the first stage of excavation is accomplished with the roof sustained by coal; (2) the long-wall method, where the whole of the coal is allowed to settle behind the miners, no sustaining pillars of coal being left. The latter method, when well planned, is the safer both as regards facility of ventilation and less liability to accidents from falls. At a Durham colliery, working the Harvey seam, which is 3½ feet in thickness, 5185 tons of coal were obtained when working by the long-wall system, and 5052 tons when working by the post-and-stall

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system. In thick and highly-inclined beds it is usual to remove the coal by horizontal slices, and to fill the excavation with waste material. In some instances blast-furnace slag is used for the purpose.

The mode of working metalliferous veins differs greatly from that followed in the case of the more or less horizontal coal-beds. Horizontal galleries, termed *levels*, are driven upon the lode usually 10 fathoms (60 feet) apart. They are rarely perpendicularly above one another, as they follow the inclination of the vein. The levels are connected by means of small shafts, termed *winzes*. Represented on a vertical plane, the vein will thus be seen to be cut up into pillars which are worked by the method of *stoping*. Of this there are two varieties—underhand and overhand stoping. In the former the ore is gradually worked away downwards from the floor of one level, the ore and worthless mineral being taken out through the level next below. In most districts underhand stoping has been superseded by the more economical overhand method, in which the miners stand on timber platforms and break down the mineral above them.

The great depth and size of modern collieries necessitate the raising of greater quantities of coal through a single shaft than was ever contemplated in former times. The winding-engines of modern erection are consequently of extraordinary power. Thus, at Harris' Navigation Colliery the engines have cylinders with a diameter of 54 inches, and are capable of raising 6 tons of coal, or, with ropes and the cages containing the coal-trucks, a total load of 15½ tons, at a speed of 32 feet per second. The quantities which can thus be raised are enormous. It is by no means uncommon for 900 to 1400 tons to be raised from one pit in the day.

In collieries both coal and men are raised in the cages, but in the metalliferous mines the man-engine is largely used. This consists of a reciprocating rod or pair of rods fitted with steps, by which the miner is raised 8 to 14 feet at a stroke. Although this method obviates the tax on the energies of the men entailed by the climbing of ladders, it is by no means free from danger. Prussian statistics show that where man-engines are employed there are four times as many accidents as where cages and ropes or where ladders are used.

At the Épinac collieries in France a remarkable pneumatic system of raising coal and men is employed. An air-tight wrought-iron tube, 5 feet 3 inches in diameter, is placed in the shaft and fitted with a piston-cage carrying nine coal-wagons. The air being exhausted above the piston, a load of 3 tons of coal is raised at a rate of 19 inches per second. The great cost of the installation has prevented the method from being generally adopted.

In almost all mines the surrounding rock contains water which rapidly accumulates in the workings. Where the contour of the district is suitable, the best method of draining the mine is by means of an *adit-level*—i.e. a tunnel driven in the hillside. In some cases extensive areas are drained by adits. Thus, the great Gwennap adit in Cornwall, which is with its branches 40 miles in length, drains 30 sq. m. As further examples of long adits may be cited the Ernst-August adit in the Harz Mountains, which has a total length of 14 miles and cost £85,500, and the Rothschönberger adit at Freiberg in Saxony, which is 25 miles long. In cases where adits are unavailable, recourse must be had to pumps either of the lifting or forcing type. The principal type of engines is that known as the Cornish pumping-engine, which is a single-acting condensing beam-engine working expansively. Some of these engines are of enormous size, the cylinders in some cases being as much as 100 inches in diameter. Their great cost and ponderous character have led to the introduction of cheaper direct-acting engines which placed underground force columns of water to vertical heights of as much as 1000 feet. At a silver-mine at Klausthal, in the Harz Mountains, a pair of direct-acting rotary engines have been erected, driven by hydraulic power, with a head of 1959 feet. At twelve revolutions per minute these pumps force 330 gallons of water up 750 feet.

The ventilation of subterranean workings is a problem of the greatest importance. The air is contaminated by the respiration of men and horses, by the combustion of lights, by the smoke of explosives, and by deleterious dust. Added to which, in the case of collieries, the insidious firedamp or carburetted hydrogen exudes from the coal. Mingled with air this gas forms the explosive mixture to which so many miners owe their death (see FIREDAMP, CHOKE-DAMP, SAFETY-LAMP). It is obvious that the ventilating current must be sufficient to dilute this mixture below the firing-point and to sweep it away. The general mode of ventilating a colliery is to have two shafts, a *downcast* and an *upcast*. The pure air entering by the downcast shaft traverses the roadways of the colliery. By means of doors and stoppings, the current is caused to travel in the required direction so as to reach the innermost workings of the mine. It then passes to the upcast shaft and returns to the surface. The motion of the air-current is caused by furnaces or by mechanical ventilators. In the former case, a large furnace is kept burning at the bottom of the upcast shaft, the air in which it heats and causes to expand. In this way a volume of air is obtained suitable for very extensive workings, as much as 120,000 to 250,000 cubic feet of air being passed through the shafts per minute. In the case of mechanical ventilators, the vitiated air is withdrawn from the colliery by the exhausting action of centrifugal fans, which may be made either of large diameter to run at low velocity, or of small diameter to run at high velocity. At several important collieries these fans attain enormous dimensions, in some cases as much as 45 feet in diameter and 14 feet in width.

Almost as important as ventilation in relation to the safety of human life is the accurate construction and the preservation of mine-plans. In many cases the plans are laid down without any reference to the phenomenon of the variation of the magnetic needle. Trusting to old plans constructed in this way, the miner may drive straight into old workings filled with water, the tapping of which would be death to all employed in the colliery.

The progressive legislation in connection with mines (e.g. the Coal-mines Regulation Act of 1872, amended 1886, which prescribes for the inspection of mines by duly appointed inspectors, &c.) has proved beneficial in diminishing the proportion borne by the accidents to the number of miners employed; for whereas in 1850, when the output of coal in the United Kingdom did not exceed 50,000,000 tons, the number of miners employed being about 200,000, the deaths slightly exceeded 1000 in the year, in 1877, when the output of coal was 134,000,000 tons and the number of miners double that in 1850, the deaths were only 1200 in number. The deaths from explosions of firedamp during the eleven years 1875–1885 formed but 23·57 per cent. of the total deaths, the remainder being due to falls of roof and other causes. For statistics of mineral production, see GREAT BRITAIN, UNITED STATES, &c.

In England and Ireland the crown has the right to all mines of gold and silver; but where these metals are found in mines of tin, copper, iron, or

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other baser metal, then the crown has only the right to take the ore at a price fixed by statute. In Scotland gold-mines belong to the crown without limitation, and silver-mines when three-halfpence of silver can be extracted from the pound of lead. As a general rule, in the United States as well as in Britain, whoever is the owner of freehold land has a right to all the mines underneath the surface, for his absolute ownership extends to the centre of the earth; but under special grants and contracts it is not uncommon for one person to be owner of the surface of the land and another to be owner of the mines beneath; or several persons may be owners of different kinds of mines lying one above the other in the different strata. On the public lands of the United States, a title or license may be obtained by any citizen from the general land office at Washington, at the rate of $5 per acre of surface pre-empted; no royalty is paid, but the claim must be worked in accordance both with local regulations and with the general mining laws, which prescribe as one condition the performance of a certain amount of work annually. If this condition is not fulfilled, the mine may be 'denounced,' and any other person secure the claim.

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Minister, a public functionary who has the chief direction of any department in a state, the ministry being the body of ministers to whom the sovereign or chief-magistrate commits the executive government (see CABINET, PARLIAMENT, TREASURY). Minister is also a term for a delegate or representative of a sovereign at a foreign court (see AMBASSADOR). Christian preachers and priests are ministers of the word of God or of Jesus Christ in Catholic usage; minister, a name, was adopted by French-speaking Protestants for their clergy, and was formerly so used by Anglicans, as it still is by Presbyterians and many Nonconformists.

Minium, or RED LEAD. See LEAD, Vol. VI. p. 543.

Miniver. See FURS.

Mink (*Putorius*), a name applied to several carnivores in the same genus as weasel, polecat, ferret, and ermine, and with essentially similar characteristics. The body measures from 12 to 18 inches in length, not including the bushy tail. The colour of the valuable fur is chestnut-brown. The Siberian Vison (*P. sibericus*), the European Vison (*P. lutreola*), and the American Mink proper (*P. vison*) are very nearly related, if indeed they are not simply varieties of one circumpolar species. They all live by rivers and lakes, in which they swim and dive, feeding chiefly on fishes, frogs, mussels, and the like; though not refusing any small mammals which come in their way. They are keen-scented, bold and persistent, but are readily tamed when caught young. See FURS.

Minneapolis, the largest city of Minnesota, adjoins the capital, St Paul, and is situated on both sides of the Mississippi, which is here crossed by twelve bridges. The Falls of St Anthony, with a perpendicular descent of 16 feet, afford a water-power which has been a chief source of the city's prosperity. The streets are wide and handsome, and there are beautiful public parks. Among the most notable buildings are the masonic hall, the post-office, the Exposition Building, and the Guarantee Loan edifice. This last is twelve stories high, built of granite and sandstone; it contains 400 offices, and on the roof is a garden where concerts are given. The churches number nearly 150, and the public schools had in 1890 more than 500 teachers and 20,000 pupils; while the state university here has five departments and about a thousand students, of both sexes. There is a public library of over 30,000 volumes. The lumber and flour mills of Minneapolis are among the largest in the country. In the latter, stones have been discarded, and the Hungarian or 'roller' process (see MILL) is employed. The total daily capacity of the mills is 35,000 barrels. The railway facilities of Minneapolis are very great, and the growth of the city has been remarkably rapid. Pop. (1870) 13,066; (1880) 46,887; (1890) 164,738.—Five miles by rail SE. of Minneapolis are the Falls of Minnehaha ('Laughing Water'), celebrated in Longfellow's *Hiawatha*.

Minnesinger, the collective name given to the lyric poets of Germany who flourished during a period marked approximately by the years 1170 and 1250. For the most part the singers were of knightly birth and belonged to the inferior nobility, though men of the very highest rank, reigning princes and even emperors, wrote these lyric effusions, and a few were of burgher birth. They get their name from the principal theme that inspired them, *minne* = 'love,' the love of fair women. Thus they were so far akin to the troubadours of Provence and France. The movement, however, though it certainly received suggestions from the singers beyond the Rhine, was essentially of native origin. The difference between the two schools is most clearly seen in the spirit of their work. The German singers wrote of love in a more refined and delicate spirit, and with a greater reverence for woman, than the troubadours. The best of them treated of the inner life of the soul, the feelings and emotions of the heart, rather than of the gallantries and adventures of a sensual love; they move in the world of imagination and idealism, shunning the real world and its gross pleasures; the shy, speechless, reverent attitude of ingenuous youth that characterised them was closely akin to the reverent homage paid to the purest and holiest of women, the Virgin Mother of Christ. Yet they did not altogether lose touch of the world. They loved to sing the praises of nature, especially of spring, the perennial inspirer of poets' hearts and tongues. Often, too, there is a decided strain of sadness and melancholy, always touches of true naïveté, and frequently of arch humour, and on occasion the sterner note of moral indignation and contempt of the follies and vices of the time. Thus, the best of the minnesinger, like Walther von der Vogelweide, the most illustrious of them all, Heinrich von Ofterdingen, Wolfram von Eschenbach, Hartmann von Aue, Gottfried von Strasburg, Heinrich von Veldeke (the earliest), and others, were distinguished on the one hand from the poets of the monasteries, who celebrated the deeds of martyr and saint, and on the other hand from the wandering gleemen, whose subjects were suited to the coarse and ignorant peasantry who formed their usual audiences. But it is not in subject only, and their spirit of treating it, that the minnesinger differ from all their contemporaries; they also paid great attention to poetical form, striving after melodious and sonorous language, regularity of verse-structure, and smoothness and correctness of versification, in all which they

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attained a high degree of skill. Their art was, however, wider than the poet's at the present day: they not only wrote the text but composed the air to which the text was to be sung, for all their lyrics were written with the express purpose of being sung to the accompaniment of viol or harp. One class alone was exempted from musical accompaniment—viz. short didactic or sententious poems called *sprüche* = 'sayings,' which were recited. As it was incumbent upon a 'singer' to invent his own combination of text and melody, and was considered dishonourable for him to appropriate those of his predecessors or contemporaries, their poems are remarkable for a great variety of forms, poetic and musical. This in course of time, when the fresh inspiration of the movement began to wane, was the fruitful cause of much artificial writing, and eventually of the decay of the art. But there were still deeper causes of decay inherent in it. The less refined of the 'singers' were unable to keep the levels of exalted sentiment of their superiors, and degenerated into false sentimentality, lifeless conventionality, and above all a gross and vulgar sensualism. The minnesinger wrote principally in the Swabian dialect of Middle High German. Their use of this language was due to the great encouragement they received from the Hohenstaufen emperors. Next to these rulers their chief patrons were the dukes of Austria, and especially Hermann of Thuringia, at whose court of Eisenach the semi-mythical Wartburgkrieg occurred (*c.* 1207). This was a poetical contest between the chief minnesinger as to the merits of the patrons of the art: Heinrich of Ofterdingen was outsung by Walther von der Vogelweide, and Heinrich's ally, the magician Klingsor of Hungary, by Wolfram von Eschenbach.

When men of knightly birth began to neglect the writing of lyric poetry, and the minnesinger were no longer held in honour in the halls of the great, the art took refuge with the burghers and craftsmen of the cities. But with the exception of Hans Sachs of Nuremberg, those *meistersinger* or *meistersänger*, as they called themselves, possessed little real poetic feeling. They formed themselves into guilds and wrote poems as they plied their trade, by purely mechanical rules, and bound themselves by a multitude of puerile restrictions and pedantic regulations. Their subjects were painfully commonplace, and their treatment destitute of all artistic feeling. Yet these singers' guilds flourished from the 13th to the 16th century; the last was not dissolved until 1839, at Ulm. Wagner's opera, *Die Meistersinger zu Nürnberg*, perpetuates their memory.

The lyrics of the 160 Minnesinger, of whom alone specimens survive, were published by Von der Hagen in 1838 (4 vols.). Modern versions have been made by Tieck (1803), Simrock (1857), and others. See A. Schultz, *Das höfische Leben zur Zeit des Minnesangs* (2 vols. 2d ed. 1889); Uhland in *Schriften zur Geschichte der Dichtung und Sage* (vol. v. 1870); and Lyon, *Minne- und Meister-sang* (1882).

Minnesota (an Indian name, signifying 'sky-tinted water'), the twentieth in population of the states of the American Union, and the northernmost in the Mississippi valley, extends from 43° 30′ to 49° N. lat., and from 91° to 97° W. long. It is bounded on the N. by Manitoba and Ontario, E. by Lake Superior and Wisconsin, S. by Iowa, and W. by North and South Dakota. Its area is 83,530 sq. m., or nearly as large as Great Britain. In Minnesota are the remote sources of the great rivers Mississippi, Red River of the North, and St Lawrence, whose waters, flowing in different directions, reach respectively the Gulf of Mexico, Hudson Bay, and the Atlantic Ocean. Within the state the Minnesota River is the largest tributary of the Mississippi. Between the St Croix River and Red River of the North are hundreds of clear lakes, the largest of which are Red Lake (530 sq. m.), Mille Lacs, and Leech Lake. About two-thirds of the state is prairie, but in the northern portion there are extensive pine-forests, and in the north-east great marshes, bearing a scanty growth of tamarack and fir. The minerals include iron (which is profitably worked), slate, granite, and other rocks, and the red pipestone. The climate is bracing in winter, very dry and equable; the mean for the year 1889 was 45°. The rainfall is sufficient and well distributed throughout the year.

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Minnesota is an agricultural and especially a wheat-producing state; its manufactories as yet are principally flour and lumber mills. The principal crops in 1889 were: wheat, 46,660,583 bushels; oats, 48,253,799 bushels; maize, 22,115,769 bushels; potatoes, 6,444,137 bushels. The facilities for commerce are great. The Mississippi is navigable as high as St Paul; the lakes, with Duluth for a port, open a waterway to the Atlantic; and there are over 5000 miles of railway in the state.

Education is well cared for. At the end of 1888 the permanent school fund exceeded $8,000,000; and during that year over 250,000 pupils were on the roll. There are four state normal schools, and a state university at Minneapolis, besides Macalester College (Presbyterian) and Hamline University (Methodist) at St Paul, Carleton College (Congregationalist) at Northfield, Episcopal schools at Faribault, and a Presbyterian college for women at Albert Lea.

History.—Minnesota was visited by French explorers in 1659–60, and the portion west of the Mississippi was part of the province of Louisiana purchased by the United States from France in 1803. Fort Snelling, at the mouth of the Minnesota River, was built and occupied in 1821. In 1837 the Chippeway Indians surrendered all the land east of the Mississippi; immigration then began, and Minnesota became a territory in 1849, a state in 1858. It claims the distinction of having, through its governor, offered the first regiment for the defence of the Union; and during the civil war, out of 40,000 citizens able to bear arms, it sent 24,000 into the army. In August 1862 occurred a terrible massacre by the Indians, who attacked the frontier settlements and in ten days killed some 800 men, women, and children. As a consequence, the Sioux and Winnebagoes were removed from the state, and their hunting-grounds are now occupied by farms and prosperous towns. The principal cities are the capital, St Paul (133,301), Minneapolis (164,738), and Duluth (32,725). Pop. (1860) 172,023; (1880) 780,773; (1890) 1,300,017, including a large proportion of Scandinavians and Germans.

Minnow (*Leuciscus phoxinus*), a small fish of the same genus as the roach, dace, chub, &c. It is widely distributed in Europe, from Norway to Italy. It is usually 3 or 4 inches long, but it occasionally in favourable localities may attain to as much as 7 inches. The minnow varies its colour; it is more brilliant when taking food, and brighter during the day than at night. The colours are most brilliant at spawning time, particularly in the males. The back is olive-brown in colour, becoming lighter at the sides with a metallic lustre. The fins are silvery gray, often rose tinted at the base. The colours become paler after spawning. The minnow is an active little fish found in large swarms, generally in shallows in summer or near the surface; in winter it conceals itself under stones and muddy banks. It is a voracious feeder, living on aquatic plants, worms, insects, small snails and fresh-water molluscs, and even its own kind; and in turn it is preyed upon by nearly

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every fish in the stream. Minnows have the peculiar habit of arranging themselves like the spokes of a wheel or the petals of a flower, with their heads towards the centre and their tails at nearly equal distances from one another when anything that can serve as food is thrown into the water. They may be caught by small hand-net or by hook and line, baited with worm or paste. They are very prolific; they breed in June, and the eggs hatch in a few days. As food they are much esteemed, cooked in various ways or dressed as 'white bait.' They are used as bait for eels, or as spinning bait for trout, perch, pike, or chub. Some fish-breeders advocate stocking rivers with minnows to feed the young salmon, but the wisdom of this proceeding has been questioned on various grounds.

Minor is, in Scotch law, the term describing a person who, if a male, is between the ages of 14 and 21; and if a female, is between 12 and 21. In England the technical term is an Infant (q.v.).

Minor. See SCALE.

Minor Barons. See BARON.

Minorca, the second largest of the Balearic Isles (q.v.), lies 25 miles NE. of Majorca. It is 28 miles long, by an average of 10 wide, and has an area of 284 sq. m. Pop. 34,173. Its coast is rocky and inaccessible, but broken by numerous inlets, and its surface low, undulating, and stony. Its productions and climate are similar to those of Majorca, though the soil is less fertile. The chief towns are Port Mahon (q.v.) and Ciudadela (8000). The island is remarkable for its great number of ancient megalithic remains (called talayots) and its stalactite caves (at Prella). See BYNG (JOHN); Bidwell's *Balearic Isles* (1876), and Sir R. L. Playfair, *Mediterranean* (3d ed. 1890, Murray's Guide-book series).

Minorites. See FRANCISCANS.

Minority. See REPRESENTATION.

Minos, the name of two mythological kings of Crete. The first is said to have been the son of Zeus and Europa, the brother of Rhadamanthus, the father of Deucalion and Ariadne, and, after his death, a judge of the shades in Hades.—The second of the same name was grandson of the former, and son of Lycastus and Ida. To him the celebrated Laws of Minos are ascribed, in which he is said to have received instruction from Zeus himself. Homer and Hesiod know of only one Minos, the king of Cnossus, and son and friend of Zeus.

Minotaur, one of the most repulsive conceptions of Greek Mythology, the offspring of Pasiphaë and a bull, for which she had conceived a passion, gratified through the contrivance of Poseidon. The queen placed herself in an artificial cow made by Dædalus, and so became the mother of the monster, half-man half-bull, a man with a bull's head. Minos, the husband of Pasiphaë, shut him up in the Cnossian Labyrinth, and there fed him with the seven youths and seven maidens, whom Athens was obliged to supply at fixed periods as a tribute, till Theseus, with the help of Ariadne (q.v.), slew the monster.

Minsk, the chief town of the Russian government of Minsk, stands on an affluent of the Beresina, 436 miles by rail WSW. of Moscow and 331 ENE. of Warsaw. Pop. (1883) 54,307, many of whom are Jews. The town existed in the 11th century; was Lithuanian in the 13th and Polish in the 15th; and was annexed by Russia in 1793. The government of Minsk has an area of 35,282 sq. m., and a pop. (1883) of 1,591,767, embracing White Russians (67 per cent.), Lithuanians (4½ per cent.), Poles (11 per cent.), and Jews (10 per cent.), with Tartars and Germans. Seventy per cent. of the soil is covered with marshes, swamps, moors, lakes, and forests; less than 24 per cent. of the total area is actually cultivated.

Minster (Lat. *monasterium*, 'a monastery'), the church of an abbey or priory; but often applied, like the German *Münster*, to cathedral churches without any monastic connection, as especially to York Minster.

Mint (*Mentha*), a genus of plants, of the natural order Labiatæ, with small, funnel-shaped, quadrifid, generally red corolla, and four straight stamens. The species are perennial herbaceous plants, varying considerably in appearance, but all with creeping root-stocks. The flowers are whorled, the whorls often grouped in spikes or heads. The species are widely distributed over the world. Some of them are very common in Britain, as Water Mint (*M. aquatica*), which grows in wet grounds and ditches, and Corn-mint (*M. arvensis*), which abounds as a weed in cornfields and gardens. All the species contain an aromatic essential oil, in virtue of which they are more or less medicinal. The most important species are Spearmint, Peppermint, and Pennyroyal.—Spearmint or Green Mint (*M. viridis*) is a native of almost all the temperate parts of the globe; it has erect smooth stems, from one foot to two feet high, with the whorls of flowers in loose cylindrical or oblong spikes at the top; the leaves lanceolate, acute, smooth, serrated, destitute of stalk, or nearly so. It has a very agreeable odour.—Peppermint (*M. piperita*), a plant of equally wide distribution in the temperate parts of the world, is very similar to spearmint, but has the leaves stalked, and the flowers in short spikes, the lower whorls somewhat distant from the rest. It is very readily recognised by the peculiar pungency of its odour and of its taste.—Pennyroyal (*M. pulegium*), also very cosmopolitan, has a much-branched prostrate stem, which sends down new roots as it extends in length; the leaves ovate, stalked; the flowers in distant globose whorls. Its smell resembles that of the other mints.—All these species, in a wild state, grow in ditches or wet places. All of them are cultivated in gardens; and peppermint largely for medicinal use and for flavouring lozenges. They are naturalised in America, where, however, the common species is *M. canadensis*, the Wild or Horse-mint. *Mint Sauce* is generally made of spearmint, which is also used for flavouring soups, &c. A kind of mint with lemon-scented leaves, called Bergamot Mint (*M. citrata*), is found in some parts of Europe, and is cultivated in gardens. Varieties of peppermint and Horse-mint (*M. sylvestris*), with *crisped* leaves, are much cultivated in Germany under the name of Curled Mint (*Krause-minze*); the leaves are dried and used as a domestic medicine, and in poultices and baths. All kinds of mint are easily propagated by parting the roots or by cuttings. It is said that mice have a great aversion to mint, and that a few leaves of it will keep them at a distance.

Spearmint (*Mentha viridis*).

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Peppermint, pennyroyal, and spearmint are used in medicine. The pharmacopœias contain an *aqua*, *spiritus*, and *oleum* of each of them; the officinal part being the herb, which should be collected when in flower. *Peppermint* is a powerful diffusible stimulant, and, as such, is antispasmodic and stomachic, and is much employed in the treatment of gastrodynia and flatulent colic. It is also extensively used in mixtures, for covering the taste of drugs. *Pennyroyal* and *spearmint* are similar in their action, but inferior for all purposes to peppermint.

Mint (Lat. *moneta*), an establishment for making coins or metallic money (see MONEY). The early history of the art being traced under the head Numismatics, the present article is mostly confined to a sketch of the constitution of the British mint, and of the modern processes of coining as there followed.

In Canute's laws, an officer called a 'reeve' is referred to as having some jurisdiction over the mint, and certain names which, in addition to that of the sovereign, appear on the Anglo-Saxon coins seem to have been those of the moneyers, an important class of functionaries, who were, until the operations of coinage were undertaken by the state in 1850, responsible for the manufacture of the coin. Besides the sovereign, barons, bishops, and the greater monasteries had the control of mints, where they exercised the right of coinage, a privilege enjoyed by the archbishops of Canterbury in the reign of Henry VIII., and by Wolsey as Bishop of Durham and Archbishop of York. After the Norman Conquest the officers of the Royal mint became to a certain extent subject to the authority of the exchequer. Both in Saxon and Norman times there existed, under control of the principal mint in London, a number of provincial mints in different towns of England; there were no fewer than thirty-eight in the time of Ethelred, and the last of them were only done away with in the reign of William III. The officers of the mint were formed into a corporation by a charter of Edward II.; they consisted of the warden, master, comptroller, assay-master, workers, coiners, and subordinates. Coining at the Scottish mint in Edinburgh ceased with the Union; but the office of master of the mint was not incorporated with the English one till 1817.

The seignorage for coining at one time formed no inconsiderable item in the revenues of the crown. It was a deduction made from the bullion coined, and comprehended both a charge for defraying the expense of coinage, and the sovereign's profit in virtue of his prerogative. In the reign of Henry VI. the seignorage amounted to 6d. in the pound; in the reign of Edward I. it was 1s. 2½d. By 18 Car. II. chap. 5, the seignorage on gold was abolished, and it has never since been exacted. The 'shere' or 'remedy,' as it is now called, is an allowance for the unavoidable imperfection of the coin in regard to both standard weight and fineness.

The function of the mint, so far as concerns the standard gold coinage, is to receive gold in ingots from individuals, and return an equivalent weight in sovereigns. But, in point of fact, gold is now exclusively coined for the Bank of England; for, although any one has the right to import gold into the mint for coinage, receiving an equivalent weight of sovereigns at the rate of £3, 17s. 10½d. per oz. standard, after a sufficient delay to allow of the gold he imports being converted into coin, he can at once receive payment on presenting his bullion at the Bank of England at the slightly lower rate of £3, 17s. 9d., and the additional 1½d. offered by the mint is not found sufficient to compensate for the necessary delay which occurs.

Silver, which was formerly a legal tender to any amount, has, by 56 Geo. III. chap. 68, ceased to be so. That act provided that each troy pound of standard silver should be coined into sixty-six shillings, and, since this exceeds the price at which the metal in its uncoined state can be purchased, it follows that the coinage of silver is a source of profit to the state. When the price fell to 42½d., this profit, or seignorage, amounted to no less than 54 per cent., and even at 5s. per ounce there remains a profit of about 10 per cent. It should, however, be borne in mind that this 'token' coinage is only a legal tender to a limited amount (forty shillings), whereas gold coin is legal tender to any amount. The profit derived from the bronze token coinage is proportionately even greater. The seignorage, which was formerly retained by the master of the mint to defray the expense of coinage, has since 1837 been paid to the credit of the Consolidated Fund.

A new mint was erected on Tower Hill in 1810. In 1815 some alterations were made in its constitution; and in 1851 a complete change was introduced in the whole system of administration. The control of the mint was then vested in a master, a deputy-master, and a comptroller. The mastership, which had, in the early part of the 19th century, become a political appointment held by an adherent of the government, was restored to the position of a permanent office, the master being the ostensible executive head of the establishment. The operative department was entrusted to the assayer, the melter, and the refiner. The moneyers, who had from early times enjoyed extensive privileges and exemptions, and were contractors with the crown for the execution of the coinage, were abolished, and the contracts with the crown were entered into by the master of the mint, who also made subordinate contracts for the actual manufacture of the coin. Further changes were made in the administration of the mint in 1869. The mastership was added to the duties of the Chancellor of the Exchequer, without any addition of salary, and the offices of deputy-master and comptroller were amalgamated. A yearly saving of £10,000 is believed to have been effected by the changes of 1851, and a further £8000 by those of 1869, with an increase of efficiency. Mints were established at Sydney and Melbourne to coin the gold so largely found in Australia, in 1853 and 1869 respectively.

Processes of Coining.—Down to the middle of the 16th century little or no improvement seems to have been made in the art of coining from the time of its invention. The metal was simply hammered into slips, which were afterwards cut up into squares of one size, and then forged round. The required impression was given to these by placing them in turn between two dies, and striking them with a hammer. As it was not easy by this method to place the dies exactly above each other, or to apply proper force, coins so made were always faulty, and had the edges unfinished, which rendered them liable to be clipped. The first great step was the application of the screw, invented in 1553 by a French engraver of the name of Brucher. The plan was found expensive at first, and it was not till 1662 that it altogether superseded the hammer in the English mint. The chief steps in coining as now practised are as follows: The gold or silver to be coined is sent to the mint, for the most part in the form of *ingots* (Ger. *eingiessen*, Du. *ingieten*, 'to pour in,' 'to cast'), or castings; those of gold weighing either about 200 or 400 troy ounces, while the silver ingots are much larger. Before melting, each ingot is weighed and tested as to its purity by Assaying (q.v.). For melting the gold, pots or crucibles of plumbago

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are used, made to contain each about 1200 ounces. The pots being heated in furnaces to a bright red heat, the charge of gold is introduced along with the amount of copper which calculation, based on the weight of the gold and its composition as ascertained by assay, proves to be necessary in order to bring it to the standard, which in Great Britain is 22 parts of pure gold to 2 of copper (see ALLOY). The metal, when melted, is poured into iron moulds, which form it into bars 21 inches long, 1¾ inch broad, and three-eighths of an inch thick, if for sovereigns; and somewhat narrower, if for half-sovereigns. For melting silver (the alloy of which is adjusted to the standard of 222 parts of silver to 18 of copper) larger plumbago crucibles capable of containing 5500 ounces are used, and the metal is cast into bars similar to those of gold.

The copper, or rather bronze coinage, first issued in 1860, is formed of an alloy consisting of 95 parts of copper, 4 of tin, and 1 of zinc. The coins are only about half the weight of their old copper representatives. The processes of casting and coining the bronze are essentially the same as in the case of gold and silver.

The operation of *rolling* follows that of casting. It consists in repeatedly passing the bars between pairs of rollers with hardened steel surfaces, driven by steam-power; the rollers being brought closer and closer as the thickness becomes reduced. At a certain stage, as the bars become longer, they are cut into convenient lengths; and, to reduce the hardness induced by the pressure, they are annealed. The finishing rollers are so exquisitely adjusted that the *fillets* (as the thinned bars are called) do not vary in thickness in any part more than the ten-thousandth part of an inch. The fillets are still further adjusted in the British mint by means of what is called the 'draw-bench,' in which they are drawn between steel blocks, as in wire-drawing, and they are then exactly of the necessary thickness for the coin intended.

The fillets thus prepared are passed to the tryer, who, with a hand-punch, cuts a trial-blank from each, and weighs it in a balance, judging by experience whether the variation found to exist from the strict legal weight is such as to justify his passing the fillet into work.

The *blanks* of which the coins are to be made are cut out by means of punching-machines of simple construction, in which two or more short steel plungers are forced by an eccentric through the fillet, and enter holes in the bed of the machine; the fillet is then advanced automatically and the operation repeated. The scrap left after the blanks are cut out, called *scissel*, is sent back to be re-melted.

To ensure their being properly milled on the edge, the blanks are pressed edgeways in a machine between two grooves, one in a fixed steel block, and the other in the face of a revolving steel disc, whereby the edge is raised and the blanks are brought to a uniform diameter. After this they are annealed to soften them, before they can be struck with dies; they are also dipped into hot dilute sulphuric acid, to remove oxide of copper from the surface. Subsequently they are washed with water, and dried in hot sawdust.

We now come to the press-room, where the blanks receive the impression which makes them perfect coins. The screw coining-presses which were erected in the mint in 1810 were superseded in 1882 by lever presses of what is known as the Uhlhorn pattern. Of these no less than sixteen now exist in the mint. It is not necessary to give any detailed account of their mode of action, but it may be explained that the lower die (see DIE-SINKING) is fixed, and, after the blank has been automatically laid on it, a steel collar which is milled on the inside rises so as to surround this blank, and, while it is thus enclosed, the upper die descends upon it, considerable pressure being applied through a lever acting on a toggle joint. It will thus be seen that at the moment at which the pressure is applied the blank is completely enclosed, the result being that all the details which exist on the two dies and on the collar are reproduced in the comparatively soft metal of the blank. The upper die then immediately rises, the collar descends, and the now finished coin is automatically pushed on one side to give place to another blank. In cases where letters are put on the edge of a coin, a collar divided into segments working on centre pins is used. On the proper pressure being applied, the segments close round, and impress the letters on the edge of the coin. It is possible to strike coins at the rate of no less than 120 per minute, but it is found that the best results are obtained when the number does not exceed 90 per minute.

After being examined with a view to remove any faulty pieces, the finished coins are now passed on to be weighed in the automatic balances, since the act regulating the coinage (33 Vict. chap. 10) provides that no gold or silver coin shall be issued from the mint which varies by more than a specified and very small amount from the exact legal standard weight. These very beautiful instruments, which were introduced in 1844 by William Cotton, governor of the Bank of England, but have since been much modified and improved, are each capable of weighing about twenty-three coins per minute within $\frac{1}{100}$th of a grain, and distributing them into three separate compartments, respectively for those which are too heavy, too light, or within the limits of weight allowed by law. The first two classes are returned to be melted, while the third class, having been rung on iron anvils with a view to eliminate such as are 'dumb,' are, so far as their manufacture is concerned, ready to be issued to the public. It is first necessary, however, that sample coins be taken for assay, as a final guarantee that they are within the limits as regards standard fineness allowed by the coinage act.

The gold coin is delivered to the importer (generally the Bank of England) as soon as finished, the *weight* of coin being the equivalent of that of the bullion imported, without making any deduction for loss in the operations of coinage or for the cost of alloying metal. Silver coin, however, is made up in bags of £100 nominal value, and stored in the mint until required by the Bank of England, Scotland, or Ireland for distribution in either of those countries, or by the government of a British colony in which imperial silver coin circulates. In the same way bronze coin is made up in bags of £5 nominal value and kept in store.

The following table gives the full legal weight in grains of all Imperial coins of gold, silver, and bronze:

Denomination.	Weight in Grains.
GOLD.	
Five pounds	616·3724
Two pounds	246·5489
Sovereign	123·2744
Half-sovereign	61·6372
SILVER.	
Crown	436·3636
Double florin	349·0909
Half-crown	218·1818
Florin	174·5454
Shilling	87·2727
SILVER.	
Sixpence	43·6363
Fourpence (Maundy)	29·0909
Threepence	21·8182
Twopence (Maundy)	14·5454
Penny (Maundy)	7·2727
BRONZE.	
Penny	145·8333
Halfpenny	87·5000
Farthing	43·7500

It will be noticed that in the case of both gold and silver the values are in proportion to the weights of the coins, but that this is not the case as regards bronze: whereas a ton of pence is nominally worth £448, the same weight of halfpence or farthings is only valued at £373, 6s. 8d.

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In the United States there are five mints—at Philadelphia (since 1793), New Orleans (1835), San Francisco (1854), Carson City, and Denver—all under the charge of the Bureau of the Mint of the U.S. Treasury Department, and presided over by the Director of the Mint. Only the first three are in active operation, the other two are really assay offices; and at Philadelphia alone all the authorised coins are struck. The United States coins and their weights are as follows, those marked with an asterisk having been discontinued:

Denomination.	Weight in Grains.
GOLD.	
Double eagle	516
Eagle	258
Half-eagle	129
Quarter-eagle	64·5
3-dollar piece	77·4
Dollar	25·8
SILVER.	
Dollar	412·5
Trade-dollar*	420
Half-dollar	192·9
Quarter-dollar	96·45
20-cent*	77·16
Dime	38·58
Half-dime*	19·2
3-cent*	11·52
MINOR COINS.	
5-cent (nickel)	77·16
3-cent (nickel)	30
2-cent (bronze)*	96
Cent (copper)*	168
Cent (nickel)*	72
Cent (bronze)	48
Half-cent (copper)*	84

The total amount of gold coinage minted from 1793 to the end of 1885 was $1,389,981,508·50; silver, $434,224,610·00; minor coin, $17,463,608·44.

Minto, SIR GILBERT ELLIOT, first EARL OF, was born at Edinburgh, April 23, 1751. As a boy he spent two years at a school at Fontainebleau under the eye of David Hume, and, after passing through the universities of Edinburgh and Oxford, in 1769 entered Lincoln's Inn, and was called to the bar in 1774. Two years later he entered parliament as a supporter of Lord North, but from 1782 attached himself to Fox and Burke. In 1794–96 he was viceroy of Corsica. He was created Baron Minto in 1797, and went out to India as governor-general in 1806. He showed great vigour in his measures for establishing order and securing the frontiers by treaties, like that of Amritsar with Ranjit Sing. He next captured Mauritius and Bourbon, the Spice Islands and Java, but returned to England as Earl of Minto and Viscount Melgund in May 1814, to die on June 21st. See his *Life and Letters*, edited by his great-niece, the Countess of Minto (4 vols. 1874–80).

Minucius Felix, an early Latin apologist, of whose history nothing is known with certainty. His name survives through his *Octavius*, a dialogue held on the beach at Ostia, between the pagan Cæcilius Natalis and the Christian Octavius Januarius. The latter succeeds in convincing his opponent, although his Christianity shows no trace of such distinctive dogmas as that of the resurrection. Cyprian's *De Idolorum Vanitate* borrows from *Octavius;* as also does Tertullian's *Apologeticus*, according to Ebert, Teuffel, Keim, Kühn, and most scholars; the opposite view, however, is argued by Salmon.

See Holden's edition (Camb. 1853), Halm's edition in the *Corpus Scriptor. Eccl. Lat.* (Vienna, 1867), and Kühn, *Der Octavius des Minucius Felix* (1882).

Minuet, the air of a graceful dance, originally from Poitou, in France, and performed in a slow tempo. The music is in ¾-time.

Minute, the 60th part of an hour; also the 60th part of a degree of a circle. See DAY, DEGREE.

Minute Men, in the American Revolution, were the militia, who were prepared for service at a minute's notice.

Minyas, in Greek Mythology, the son of Chryses, the eponymous hero of the *Minyæ*, from whom were descended most of the Argonauts. He built the city of Orchomenus. His three daughters, Clymene, Iris, and Alcithoë, or Leuconoë, Leucippe, Alcithoë, were changed into bats for having made light of the mysteries of Dionysus.

Miocene System (Gr., 'less recent'). The name was applied by Lyell to that division of the Tertiary strata which contains a smaller proportion of recent species of Mollusca than the Pliocene System (q.v.), and a larger proportion than the Eocene. Of late years the lower part of the Miocene has been separated from that system, and now ranks as a separate system (see OLIGOCENE). No true Miocene deposits occur in Britain. Marine accumulations of this age are sparingly developed in Belgium (Black Crag), and cover considerable areas in the low grounds of Touraine (*Faluns de la Touraine*) in the west of France. In the Rhine valley Miocene beds extend from the Taunus southwards (Mainz Basin). These beds are chiefly of fresh-water origin—the lower portion being marine. A more important Miocene area is met with in the Vienna Basin. Here the lower series of beds is marine, while the overlying strata are less distinctly so, many of the fossils indicating brackish-water conditions. Another interesting development of Miocene occurs in Switzerland and South Bavaria—the beds being partly marine and partly of fresh-water origin. These are the more important European areas. In North America marine Miocene strata occur sparingly on the Atlantic borders of the eastern states; while fresh-water deposits of the same age are widely spread in the western states and territories. Miocene beds have been met with far within the Arctic Circle, in Greenland and Spitzbergen.

Life of the Period.—The flora of the earlier stages of the Miocene of central Europe is indicative of somewhat tropical conditions, the nearest representatives of many of the more characteristic plants being now confined to India and Australia. Palms seem at that time to have flourished over a large part of Europe, and with these were associated conifers (Sequoia, Libocedrus), evergreen oak, fig, laurel, cinnamon, various proteaceous plants (Banksia, Dryandra), olive, magnolia, maple, myrtle, mimosa, acacia, &c. Later on the climate became more temperate, for we meet with species of birch, alder, oak, beech, chestnut, plum, willow, poplar, &c. Among the more notable terrestrial animals of the Miocene were Dinotherium, Mastodon, Anchitherium, Hyotherium, species of rhinoceros, tapir, fox; a gigantic form of ant-eater (Macrotherium); Helladotherium, allied to the giraffe; Machairodus, a lion-like, sabre-toothed carnivore; various antelopes and deer with small horns and antlers; opossums, apes, and monkeys. The molluscs of the marine Miocene are all modern types—those of the older strata having a tropical or subtropical facies, while the shells in the younger strata seem, like the plants, to indicate milder climatic conditions.

In Miocene times the British area was probably dry land, and the same appears to have been the case with all northern Europe. The sea, however, overflowed the low grounds of Belgium and extended into north-west Germany. It is not unlikely, indeed, that most of the Low Countries, Hanover, and Sleswick-Holstein, were at that time submerged. In like manner the sea covered wide areas in the north-west and west of France, extending into the heart of the country now drained by the Loire and its affluents the Cher and the Indre, and stretching across the old district of Aquitania to the Mediterranean. Spain and Portugal then formed an island, considerable tracts in the south and east of Spain being submerged. From the Gulf of Lions a long arm of the sea passed up the valley of the Rhone, and swept north-east through northern Switzerland, sending a branch into the Mainz basin, and then traversing Bavaria, across which it continued to the wide sea which then occupied all the great plains of Hungary. Northern

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and eastern Italy were at the same time under water, as was also the case with many parts of eastern Europe and Asia Minor. Southern Europe was thus in the Miocene period an extensive archipelago, in which the plateaus of Spain and central France, the Alps, the Carpathians, &c. existed as islands. The most continuous land-mass was in the north of Europe: and if the Miocene of the Arctic regions, with its abundant flora, be of the same age as the Miocene of Europe, then we may infer that a vast area of the North Atlantic existed on dry land, across which migrations of the flora took place. Considerable movements of elevation seem to have occurred in Europe before the close of Miocene times, causing the sea to disappear from wide regions which it had formerly occupied. Thus, the Mainz basin and the sea that occupied much of northern Switzerland, &c. were replaced by fresh-water lakes, while the wide sea of the Vienna basin was much reduced in size, and eventually became freshened—the conditions resembling those that characterise the Black Sea.

Miquelon, GREAT and LITTLE, two islands connected by a long, narrow, sandy isthmus, off the south-west coast of Newfoundland, forming with St Pierre the sole remaining colony of France in North America. Fishing is nearly the sole occupation, and dried and fresh cod and cod-liver oil are exported. Area, 78 sq. m.; pop. (1885) 5765.

Mir, the Russian commune, consisting of the inhabitants of one or more villages, who are as a community owners of the surrounding land, and redistribute the same to the members from time to time. See LAND LAWS, Vol. VI. p. 502; RUSSIA; VILLAGE COMMUNITIES.

Mirabeau, VICTOR RIQUETI, MARQUIS DE, father of the great statesman of the French Revolution, was born, October 5, 1715, at Pertuis in Provence, of a family that claimed a noble Florentine descent, but was really sprung from a wealthy bourgeois family of Digne and Marseilles that had acquired in 1570 the domain of Mirabeau by purchase, and the title in 1685. He was an able but eccentric and exceedingly hot-headed and self-willed man, and he showed himself a senseless and brutal tyrant in the treatment of his family. It is said that he procured at one time or other no fewer than fifty-four *lettres de cachet* against his wife and children, and he strove to curb the extraordinary genius of his greatest son by a course of unnatural severity, which ended with shattering all the ties of kindred and driving him into the most defiant and reckless excesses. Yet he was himself a theoretical philanthropist and active promoter of physiocratic ideas, and in this cause published a series of books, as *Ami des Hommes* (5 vols. 1755) and *La Philosophie rurale* (4 vols. 1763), in which the vigour of phrase often foreshadows the stronger hand of his son. He died at Argenteuil, 13th July 1789.

See Loménie, *Les Mirabeau* (1878-89), and Oncken, *Der ältere Mirabeau* (Bern, 1886).

HONORÉ GABRIEL RIQUETI, COMTE DE MIRABEAU, the greatest figure in the French Revolution, and perhaps the ablest statesman that France has yet produced, was born at Bignon in Provence, 9th March 1749, of a family that had been for three generations famous for stormy passions and great abilities. Within his vigorous frame and massive intellect were concentrated all the good and all the evil of his race; his unusually ugly face, scarred with smallpox and crowned with an immense mane of black hair, bore unmistakably the stamp of power, and from boyhood he possessed a marvellous personal fascination which subdued all men and women to his will. His education was left to take care of itself, and at seventeen he entered as a lieutenant the Berri regiment of cavalry, and lived a life of such recklessness at the little garrison-town of Saintes that his imperious father imprisoned him in 1768 on the Isle of Rhé, near La Rochelle, and next sent him with the French legion of Lorraine to Corsica, where his conduct earned him the confidence of his chiefs and the affection of his men. But his father refusing to purchase him a company, he left the service in 1770, and settled down to practise the physiocrat system on an estate in Limousin. Two years later his father married him to the only daughter of the Marquis de Marignan, a sprightly and pretty, but vain and shallow woman, with whom he broke out into lavish expenditure, and lived unhappily. On account of his debts his father confined him, in May 1773, in the town of Manosque, next in the Château d'If, near Marseilles, and at last in 1775 in the castle of Joux, near Pontarlier. Here he formed an intrigue with Sophie de Ruffey, the young wife of the gray-haired legal president, the Marquis de Monnier, and fled with her to Switzerland and thence to Amsterdam, where for eight months he made his bread by laborious hack-work for the Dutch booksellers, among other tasks translating from the English Watson's Life of Philip II. His *Essai sur le Despotisme*, begun at Manosque and now completed, made a sensation by its audacity and vigour. Meantime the parlement of Besançon sentenced him to the penalty of death, in contumacious absence, for abduction and robbery, and caused a paper effigy of him to be beheaded. The search made for him at the instigation of his father at length proved successful, and in May 1777 he was handed over by the States-general and flung into the frowning castle of Vincennes, where, in a close imprisonment of three years and a half, and after he had worked off his grosser feelings in writing the indecent *Erotica Biblion* and *Ma Conversion*, he worked out his own salvation by study and meditation, and the writing of his famous *Essai sur les Lettres de Cachet et les Prisons d'État* (2 vols. 1782). His too glowing letters from the prison to Sophie were discovered later by Manuel in the archives of police at Paris, and published under the title of *Lettres originales de Mirabeau, écrites du Donjon de Vincennes* (4 vols. 1792). In December 1780 Mirabeau was released, and he at once began by a bold process to labour for his restoration to society. At length, September 1782, after eloquent pleadings that drew upon him all eyes in France, he succeeded in getting his sentence annulled. Next year he lost his suit at Aix for the restitution of his conjugal rights, but did something by the attempt to rehabilitate his reputation. Now also he broke off the illicit relation with his mistress, who had not remained true to him, and whose later disappointments in love drove her to the refuge of suicide in September 1789.

Again flung upon his own resources, deeply drowned in debt, and thriftless and extravagant by temperament, Mirabeau made for some years a shifty living by his pen, writing and compiling innumerable books and pamphlets against speculation, stock-jobbing, and other political and social evils of the time, and flitting restlessly from France to Prussia, to Holland, and to England. His grosser passions had not yet burned themselves out, and his life was stained by countless unworthy *liaisons*, amid which one woman alone—the Dutch Madame de Nehra—stands out as an elevating influence. In England he was intimate with Sir Gilbert Elliot, afterwards first Earl of Minto, Lord Lansdowne, and Romilly, and his close observation of English politics taught him the good of moderation, compromise, and opportunism. In 1786 he

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was sent by the French government on a secret mission to Berlin, and there from Major Mauvillon he obtained the materials for his work, *Sur la Monarchie Prussienne sous Frédéric le Grand* (4 vols. 1787). When the States-general was convened he offered himself as a candidate to the nobles of Provence, and was rejected, whereupon he turned to the *tiers état* and was returned enthusiastically for both Marseilles and Aix. He chose to sit for the latter, and, badly received though he was at first, soon showed himself a born leader of men, as well as the one really practical statesman in the Assembly. On the 17th June, on the motion of Sieyès, the *tiers état* constituted itself as the National Assembly, and on the 23d Mirabeau made his memorable answer to the royal messenger, the Marquis de Dreux-Brézé, who had come from the king to command the deputies to separate: 'If you have orders to remove us from this hall, you must also get authority to use force, for we shall yield to nothing but to bayonets.'

Mirabeau's political sagacity and foresight quickly made him a great force in the Assembly, while his audacity and volcanic eloquence made him at once the darling of the mob and the terror of the court. Meantime he extended his influence by unceasing diligence in journalistic work, and for his *États-Généraux, Lettres à mes Commettants*, and *Courrier de Provence*, drew on the knowledge and abilities of a host of coadjutors, such as the Genevese Duroveray and Étienne Dumont. Moved by his instinctive dread of anarchy, he proposed the establishment of a citizen-guard, out of which grew the National Guard, but he trembled at the 'nocturnal orgies' of August 4, 1789, when in the breathless legislation of a single night were swept away together serfdom, feudal jurisdiction, manorial ground-rents, tithes, game-laws, saleable offices, fees, clerical robing dues, municipal and provincial privileges, privileges of rank, exemptions from taxes, and plurality of offices and livings. None of his contemporaries equalled him in breadth of view, temperance in judgment, and freedom from prejudice—no actor in the great drama save himself saw that 'the notion of equality is only a fit of the revolutionary fever.' He saw clearly the fatuity of such schemes as the foolish Lafayette's theatrical declaration of the rights of man, pointing out that such a thing might well enough be done after the work of constructing the constitution had been accomplished. Mirabeau was not personally responsible for the furious *émeute* of October 5 and 6, which brought the king to Paris, for indeed hatred of anarchy was his most deeply-rooted political principle. As early as May 1789 he had tried in vain to come to terms with Necker and Lafayette, yet his character was too magnanimous to desire revenge for the rebuffs with which his overtures had been received. He formed a warm friendship with the Count de la Marck, a particular friend of Marie Antoinette, and in conjunction with him he drew up his first memoir for the guidance of the court, just after the transference of the king and Assembly to Paris. In this admirable paper he set forth the necessity for a new constitution, the initiative to come from the king; that all that had been passed must be ratified, and a responsible ministry appointed after the pattern of the English parliamentary usage; and that the king must leave Paris for some such loyal city as Rouen, and throw himself frankly upon France. He suggested a ministry, with Necker and Lafayette as its prominent members, himself to have a seat but no portfolio. But the infatuated queen detested and distrusted the great tribune, and the Assembly, mad with suspicion and fear, passed a suicidal self-denying ordinance (November 7, 1789) that no member should take office under the crown while holding his seat, or for six months after. Mirabeau's hopes were thus blasted for the time, yet he worked on with unabated energy. He surrounded himself with a group of able and enthusiastic friends who provided him with his facts, and even wrote for him his speeches and articles, content to efface themselves to enhance a beloved master's glory. Never was there so marvellous a collaboration of unpaid enthusiasm: Dumont wrote the political speeches; Clavière, the financial; the Abbé Lamourette, those on the civil constitution of the clergy. Pellenc, the private secretary, constantly accumulated facts; the Genevese Reybaz wrote the speeches on the assignats, and on the right of making war and peace. The orator took freely these materials so generously prepared for him, fused them in the alembic of his own marvellous genius, and stamped them afresh with the impress of his own individuality.

In the spring of 1790 communication opened anew with the court, and fresh appeals were made to Lafayette. If Mirabeau was a bitter enemy of feudalism he was a devoted friend of order, and saw the necessity of a strong executive as its foundation, but he was constantly mortified to find himself mistrusted and misunderstood. His past rose up in judgment against him, and he could not gain the full confidence either of the respectable classes or of the court—as he himself said bitterly to Dumont, 'The sins which I committed in my youth are giving me their full punishment now.' The court provided money to pay his debts, which were scheduled at 208,000 livres—among them the bill for his wedding-clothes—and agreed to allow him 100 louis a month, with 300 livres for De Comps, his copyist, whereupon Mirabeau broke out into indiscreet extravagance. He risked all his popularity by successfully opposing Barnave's motion that the right of peace and war should rest not with the king but the Assembly. On the 3d July the queen gave him an interview in the gardens at Saint-Cloud, and at its close Mirabeau, with the fine chivalry of his nature, as he bent to kiss her hand, assured her with the words, 'Madame, the monarchy is saved.' But as the popular movement progressed his dream of placing the king at the head of the revolution became more and more a dream, and he was cut to the heart to find, as he did by the winter of 1790, that the court did not yet grant him its full confidence, but listened also to other counsellors than himself, and that it would not accept his plan of an appeal to the provinces. He inspired Montmorin in his management of foreign affairs, and showed himself a really great financier in his measures to avert national bankruptcy, while he continued to interchange notes of advice with the court. His secret aim was now to undermine the popularity and influence of the Assembly, and compel it to dissolve. Neither counter-revolution nor foreign intervention were within his schemes, but the advent of a new assembly, which he hoped to guide to a moderate conception of liberty and to wise concessions to the throne. He suggested the establishment of a bureau of correspondence with the provinces, a publishing committee to buttress the cause of order with the throne as its centre, a plan for gaining over the chief members of the present Assembly in preparation for its dissolution, and an organised system of ascertaining the opinions of journalists and leading politicians. But the queen would not commit herself to the tribune, and Mirabeau's heart sank within him as he saw slip from his grasp his great dream of establishing a responsible parliamentary government in France. This summer his health and eyesight gave way alarmingly, but he refused to abate his giant labours. In December 1790 he was elected

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president of the Jacobin Club; as well as an administrator of the Seine department, and in the January following one of its eight directors; but by Lafayette's influence he was defeated in his candidature for the office of its procureur-general-syndic, as well as for the presidency. He was chosen, however, commandant of the battalion of National Guards of his district, and on January 30, 1791, was at last elected president of the Assembly for the fortnight, and none showed more dignity and impartiality in the office. He overthrew the proposed law against emigration, and that same evening at the Jacobin Club bore down all opposition by his irresistible eloquence, and left the club amid thunders of applause. He opposed vigorously the motion of Sieyès (March 22) that in the event of the king's death the regent should be elected by the Assembly, as an abandonment of the hereditary principle, and carried his point. But his health was fast sinking, although he refused to allow himself any relaxation—a splendid atonement of self-sacrifice for the errors of his youth. His last battle was on the rights of property in mines, into which debate he threw himself with the enthusiastic chivalry of friendship, for it was a question closely affecting the interests of his dear friend De la Marck. He returned from the Assembly utterly exhausted, with the words, 'Your cause is won, but I have got my death-blow.' On the last day of his life he said, with the prophetic foresight of genius, 'I carry with me the ruin of the monarchy. After my death factions will dispute about the fragments.' As he looked on the sun he exclaimed, 'If that is not God, it is at least his cousin.' The famous chemist Cabanis from the first gave no hope, and on the morning of April 2, 1791, after a night of agony, when speech had gone, he wrote on a slate, 'Sleep—I wish only to sleep,' and a few moments after his heart had ceased to beat. He was buried in the Pantheon amid universal mourning, his funeral procession extending for about four miles. Another National Assembly, the Convention, two and a half years afterwards, when the papers revealing the secret relations of Mirabeau and the court were discovered in the king's iron chest, ordered the body to be disinterred from the Pantheon and cast into the churchyard of Sainte-Catherine.

'Do not rejoice over the death of Mirabeau,' said the king to Marie Antoinette; 'we have suffered a greater loss than you imagine.' That loss was the one influence that might still have saved the throne, and averted a deluge of blood in which the light of liberty was itself extinguished.

His writings were collected by Blanchard (10 vols. 1822). For his life, see especially the *Mémoires Biographiques, Littéraires, et Politiques de Mirabeau écrits par Lui-même, par son Père, son Oncle, et son Fils Adoptif*—Lucas de Montigny, son of Madame de Nehra (8 vols. 1834; Eng. trans. down to the commencement of his public life, in 4 vols. 1835–36). See also Dumont, *Souvenirs sur Mirabeau* (1832), and A. Stern, *Das Leben Mirabeaus* (2 vols. 1889); and for his political ideas especially M. de Bacourt's *Correspondance entre le Comte de Mirabeau et le Comte de la Marck pendant les Années 1789, 1790, et 1791* (3 vols. 1851). Loménie's work, *Les Mirabeau* (3 vols. 1878–89), is mostly upon his father and uncle. Other works of value are Ph. Plan, *Un Collaborateur de Mirabeau*—Reybaz (1874); H. Reynald, *Mirabeau et la Constituante* (1873); and Aulard, *L'Éloquence parlementaire pendant la Révolution Française* (1882). See also the Histories of the Revolution of Carlyle, Von Sybel, and H. Morse Stephens (vol. i.), also essays by Carlyle (*Miscellanies*, vol. iv.) and Henry Reeve (*Royal and Republican France*, vol. i. 1872).

ANDRÉ BONIFACE RIQUETI, VICOMTE DE MIRABEAU, brother of the preceding, was born 30th November 1754 at Bignon, and from an early age was notorious for his ill-regulated life and for a thirst that earned him the nickname of 'Barrel Mirabeau.' It was as he said the only vice his brother had left for him. He fought with distinction in the American war, and at the outbreak of the Revolution was returned to the States-general by the nobility of Limoges. Here he showed himself a fierce aristocrat in policy, and after the death of his brother he quitted France, and raised on the Rhine the 'Hussards de la Mort,' a legion of embittered *émigrés*, with whom he began in 1792 a bloody partisan warfare against his country. He was run through by accident, 15th September of the same year, at Freiburg in Breisgau.

Miracle, a term commonly applied to certain marvellous works (such as healing the sick, raising the dead, changing of water into wine) ascribed in the Bible to some of the ancient prophets, and to Jesus Christ and his followers. It signifies simply that which is wonderful—a thing or a deed to be wondered at, being derived directly from the Latin *miraculum*, 'a thing unusual'—an object of wonder or surprise. The same meaning is the governing idea in the term applied in the New Testament to the Christian miracles, *teras*, 'a marvel,' 'a portent;' besides which, we also find them designated *dynameis*, 'powers,' with reference to the power residing in the miracle-worker, and *sēmeia*, 'signs,' with a reference to the character or claims of which they were assumed to be the witnesses or guarantees. Under these different names the one fact recognised is a deed acknowledged by the common judgment of men to exceed man's ordinary powers; in other words, a deed *supernatural*, beyond the common powers of nature, as these are understood by men.

In the older speculations on the subject, a miracle was generally defined to be a violation or suspension of the order of nature. While, on the one hand, it was argued that such a violation or suspension was absolutely impossible and incredible, it was maintained, on the other, that the Almighty, either by His own immediate agency, or by the agency of others, could interfere with the operation of the laws of nature, in order to secure certain ends which without that interference could not have been secured, and that there was nothing incredible in the idea of a law being suspended by the Person by whom it had been made. The laws of nature and the will or providence of God were, in this view, thus placed in a certain aspect of opposition to each other, at points here and there clashing, and the stronger arbitrarily asserting its superiority. Such a view has, with the advance of philosophical opinion, appeared to many to be inadequate as a theory, and to give an unworthy conception of the Divine character. The great principle of Law, as the highest conception not only of nature, but of Divine Providence, in all its manifestations, has asserted itself more dominantly in the realm of thought, and led to the rejection of the apparently conflicting idea of 'interference,' implied in the old notion of miracle. Order in nature and a just and uncapricious will in God were felt to be first and absolutely necessary principles. The idea of miracle, accordingly, which seems to be now most readily accepted by the advocates of the Christian religion, has its root in this recognised necessity.

All law is regarded as the expression, not of a lifeless force, but of a perfectly wise and just will. All law must develop itself through natural phenomena; but it is not identified with or bound down to any necessary series of these. If we admit the mainspring of the universe to be a living will, then we may admit that the phenomena through which that will, acting in the form of law, expresses itself, may vary without the will varying or the law being broken. We know absolutely nothing of the mode of operation in any recorded miracle; we only see

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certain results. To affirm that these results are either impossible in themselves, or necessarily violations of natural law, is to pronounce a judgment on imperfect data. We can only say that, under an impulse which we must believe proceeds from the Divine will, in which all law subsists, the phenomena which we have been accustomed to expect have not followed on their ordinary conditions. But from our point of view we cannot affirm that the question as to *how* this happens is one of interference or violation; it is rather, probably, one of higher and lower action. The miracle may be but the expression of one Divine order and beneficent will in a new shape, the law of a greater freedom, to use the words of Trench, swallowing up the law of a lesser. Nature being but the plastic medium through which God's will is ever manifested to us, and the design of that will being, as it necessarily must be, the good of His creatures, that theory of miracle is certainly most rational which does not represent the law of nature and the will of God as separate and opposing forces, but which represents the Divine will as working out its highest moral ends, not against but through law and order, and evolving from these a new issue, when it has a special beneficent purpose to serve.

The evidence for the Christian miracles is of a twofold kind—external and internal. As alleged facts, they are supposed to rest upon competent testimony, the testimony of eye-witnesses, who were neither deceived themselves, nor had any motive for deceiving others. They occurred not in privacy, but for the most part in the open light of day, amidst the professed enemies of Christ. They were not isolated facts, nor wrought tentatively, or with difficulty, but the repeated, the overflowing expression, as it were, of an apparently supernatural life. The gospel miracles, moreover, are supposed in themselves to be of an obviously Divine character. They are miracles of healing, of beneficence, in which the light equally of the Divine majesty and of the Divine love shines.

Spinoza strongly controverted the possibility of miracles, explaining by natural causes the events recorded as such. The English Deists also rejected them, and explained the tradition of them as due to mistaken allegory, 'enthusiasm,' or even conscious fraud on the part of the narrators. Hume's famous argument was that miracles are incapable of proof, because they rest on testimony, and no testimony can be so strong and convincing as our own experience of the uniformity of nature; this was answered in Campbell's *Dissertation on Miracles* (1762). The German rationalists of the school of Paulus explained the miracles as exaggerations or misapprehensions of quite ordinary events. Strauss (q.v.) caustically criticised these so-called explanations and brought forward his 'Mythical Theory,' according to which the gospel miracles originated in the fixed conviction that the Messiah would perform certain wonders; and the faithful, intent on seeing in Jesus a complete fulfilment of the Old Testament prophecy, allowed the 'mythopœic instinct' to invent the fulfilment, and ascribe to Jesus as miracles what were really the symbolisations of abstract ideas. The Positive philosophy expressly excludes miracles; many of the representatives of natural science (Huxley, Tyndall, Spencer) and historical investigators (Buckle, Lecky) treat belief in them as pure superstition.—The literature is very extensive. See the manuals of Dogmatics by Schleiermacher, Rothe, Auberlen, Schenkel, Schweitzer, Weisse, Lipsius; the special German works on miracle by W. Beyschlag (1863), F. Nitzsch (1865), H. Cremer (1865), Flügel (1869), Bender (1871), Lommatzsch on Schleiermacher's conception (1872), J. Kreyher (1880), R. Kübel (1883), and Gloatz (1886); Bushnell's *Nature and the Supernatural* (New York, 1858); M'Cosh, *The Supernatural in Relation to the Natural* (1862); the Duke of Argyll's *Reign of Law* (1866); and J. Lias, *Are Miracles Credible?* (1883). See also Trench, *Notes on the Miracles* (1846); Mozley's admirable *Eight Lectures on Miracles* (1865); and the expository books on our Lord's miracles by Godet (1867), Steinmeyer (Eng. trans. 1875), Taylor (New York, 1880); and Laidlaw (1890); and for the relation of the scriptural to the ecclesiastical miracles, Conyers Middleton's *Free Inquiry* (1748) on the one side, and Newman's *Two Essays* (1870) on the other. Protestants hold that miracles ceased with or soon after the apostolic age; the Catholic Church holds that the gift of miracles is a permanent possession, manifested from time to time. While the scriptural miracles must be accepted without doubt, as resting on Divine faith, the ecclesiastical miracles are not the object of this faith—they must be tested, and Catholics are not bound to believe in any miracle not in Scripture. See CANONISATION, STIGMATISATION, LOURDES, KNOCK, &c., also CONVULSIONARIES; on the evidences generally, the article APOLOGETICS; and for another aspect of miracles, see A. R. Wallace, *On Miracles and Modern Spiritualism* (1876).

Miracle Plays. See MYSTERIES.

Mirage. The density of the air generally diminishes with the height; rays of light proceeding obliquely upwards from an object then become more and more nearly horizontal, but generally pass away into space. Assume the density to diminish with the height with unusual rapidity, as when the air is cooler the nearer it is to the earth; the obliquely ascending rays may become quite horizontal and then bend down towards the earth, reaching it at a distant point. The observer at that point sees distant objects at an unusual elevation, or sees above the true horizon erect images of objects which may or may not be beyond the horizon. This is what the sailors generally call looming, and it causes us sometimes to see distant coasts with unusual distinctness, or to see from a mountain top a double horizon, such as is regularly seen in the autumn mornings from the Colorado foot-hills across the prairies. If the layer of air near the earth, say 50 or 100 feet thick, be uniformly dense, as in the cold air over a frozen sea, and a warmer stratum lie above it in which the density rapidly diminishes, so that the rays are brought back to the earth as above, we find, on tracing the path of the rays reaching the observer from the top and the bottom of the distant object respectively, that these rays have crossed one another in the hot stratum; the observer therefore seems to see the object suspended in the air, magnified and upside down; and this may happen while the observer sees the object itself by direct vision through the lower air. An intermediate stratum between a cold ground-stratum and a warm upper stratum gives rise to more than one image, inverted or erect, or both, according to positions. In the mirage of the Sahara and other arid deserts the conditions are reversed; the air is hottest nearest the hot sand; skylight rays descending become bent upwards; the eye receives an impression resembling that produced by the reflection of skylight from water; the illusion is rendered more perfect by the flickering due to convection currents, which causes an appearance like a breeze playing over the illusory water.

The phenomena of mirage are frequently very strange and complicated, the images being often much distorted and magnified, and in some instances occurring at a considerable distance from the object, as in the case of a tower or church seen over the sea, or a vessel over dry land, &c. Looming is very frequently observed at sea, and a most remarkable case of this sort occurred on the 26th of July 1798, at Hastings. From this place the French coast is 50 miles distant; yet from the seaside the whole coast of France from Calais to near Dieppe was distinctly visible, and continued so for three hours. In the Arctic regions it is no uncommon occurrence for whale-fishers to discover the proximity of other ships by means of their images seen elevated in the air, though the ships themselves may be below the horizon. Generally,

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when the ship is above the horizon, only one image, and that inverted, is found; but when it is wholly or in great part below the horizon, double images, one erect and the other inverted, are frequently seen. The faithfulness and distinctness of these images at times may be imagined from the fact that Captain Scoresby, while cruising off the coast of Greenland in 1822, discovered the propinquity of his father's ship from its inverted image in the sky. Another remarkable instance of mirage occurred in May 1854, when from the deck of H.M. screw-steamer *Archer*, then cruising off Oesel, in the Baltic, the whole English fleet of nineteen sail, then nearly 30 miles distant, was seen as if suspended in the air upside down. Beside such phenomena as these, the celebrated *Fata Morgana* (q.v.) of the Straits of Messina sinks into insignificance. The *Spectre of the Brocken* is a magnified shadow of persons, &c., on the summit of the mountain, seen at sundown and sunrise thrown on mist banks on the side of the mountain opposite to the sun, with or without rainbow colours. This is rather a *glory* than a mirage proper (see HALOS). Its varieties are indeed numberless, and we refer those who wish for further information to Brewster's *Optics*, to Biot's *Traité de Physique*, and for the mathematical theory of the mirage to Tait on Mirage, *Trans. Roy. Soc. Edin.*, 1881. See also REFLEXION and REFRACTION.

Miraj, a native state of India in the southern Mahratta country; pop. 69,732. The capital, Miraj, near the Kistna River, has a pop. of 20,616.

Miramar, a palace standing on the rocky shore of the Adriatic near Grignano, 6 miles NW. of Trieste, the home of the Archduke Maximilian, afterwards Emperor of Mexico. See also MAJORCA.

Miramichi, the second river (220 miles) of New Brunswick, entering the Gulf of St Lawrence through Miramichi Bay. It is navigable to 2 miles above Newcastle, the principal town on its banks. Salmon and trout abound both in the river and its tributaries, in one of which there is a government fish-breeding establishment.

Miranda, or SÁ DE MIRANDA, FRANCISCO DE (1495–1558), a Portuguese poet, founder of the school of which Camoens is the most brilliant representative. His earlier efforts were written in Spanish; his sonnets were the first written in Portuguese; his most characteristic works, his epistles in verse, are all in Portuguese but one. His works appeared at Lisbon in 1595: a better edition in 1614; the most scholarly one, by Vasancellos, at Halle in 1885.

Miran'dola, a town of Northern Italy, 19 miles by rail NNE. of Modena. It has a fine cathedral and an old castle. Pop. 3059. See PICO.

Mirecourt, a town in the department of Vosges, 236 miles by rail ESE. of Paris, with manufactures of lace and musical instruments. Pop. 5341.

Mirfield, a manufacturing town in the West Riding of Yorkshire, 3 miles W. by S. of Dewsbury, and 4½ NE. of Huddersfield. It has a town-hall (1868), a parish church (restored in 1871 by Sir G. G. Scott), and manufactures of woollen cloths, carpets, blankets, &c. Pop. of parish (1851) 6966; (1881) 15,872—11,508 in the town.

Mirror, a reflecting surface, usually made of glass lined at the back with a brilliant metal, so as strongly to reflect the image of any object placed before it. When mirrors were invented is not known, but the use of a reflecting surface would become apparent to the first person who saw his own image reflected from water; and probably for ages after the civilisation of man commenced the still waters of ponds and lakes were the only mirrors; but we read in the Pentateuch of mirrors of brass being used by the Hebrews. Mirrors of bronze were in very common use amongst the ancient Egyptians, Greeks, and Romans, and many specimens are preserved in museums. Praxiteles taught the use of silver in the manufacture of mirrors in the year 328 B.C. Mirrors of glass were first made at Venice in 1300; and judging from those still in existence—of which one may be seen at Holyrood Palace, in the apartments of Queen Mary—they were very rude contrivances, in comparison with modern ones. It was not until 1673 that the making of mirrors was introduced into England. It is now a very important manufacture; and mirrors can be produced of any size to which plate-glass can be cast. After the plate of glass is polished on both sides, it is laid on a perfectly level table of great strength and solidity, usually of smooth stone, made like a billiard-table with raised edges; a sheet or sheets of tinfoil sufficient to cover the upper surface of the glass are then put on, and rubbed down smooth, after which the whole is covered with quicksilver, which immediately forms an amalgam with the tin. The superfluous mercury is then run off, and a woollen cloth is spread over the whole surface, and square iron weights are applied. After this pressure has been continued a day and night, the weights and the cloth are removed, and the glass is removed to another table of wood, with a movable top, which admits of gradually increasing inclination until the unamalgamated quicksilver has perfectly drained away, and only the film of amalgam remains coating the glass, and perfectly adherent to it. Mirrors are also made by silvering glass with an ammoniacal solution of a silver salt to which tartaric acid and sugar-candy have been added.

Heat is reflected like light; so that a concave mirror may be used to bring rays of heat to a focus. In this way combustible substances may be set on fire at a distance from the reflector whence they receive their heat. Thus used, a mirror is called a *Burning Mirror*.

The mirror is one of the most characteristic features of Japanese life and legend. It is usually of bronze, convex, polished by mercurial amalgam, and engraved on the back. In a few specimens the mirror may be used as a mirror in the ordinary way, but bright light reflected from its polished surface on to a screen gives bright-lined images corresponding to the figures on the back. This property of the so-called *Magic Mirror of Japan* is (according to Professors Ayrton and Perry) due to inequalities of curvature associated with inequalities of thickness, the thicker portions being the flatter.

Mirza (a contraction of *Emir Zadah*, 'son of the prince'), a Persian title, equivalent to 'Prince' when it *follows* the surname, and merely the common title of honour (like our 'Mr') when it is *prefixed* to it.

Mirzapur, a town and district in the North-western Provinces of British India. The town stands on the right bank of the Ganges, 45 miles by rail SW. of Benares. It has manufactures of shellac, carpets, and brass-wares. Pop. (1881) 56,378. The *district* has an area of 5223 sq. m., and a pop. (1881), almost all Hindus, of 1,136,796.

Miscarriage. See ABORTION.

Misdemeanour, in the law of England and Ireland, means a crime not involving forfeiture of property on conviction. Every crime is either treason, felony, or misdemeanour; and in creating new offences the legislature determines how they are to be classed. The distinction between felony and misdemeanour is not logically drawn, and it would disappear if the criminal law were codified on a rational plan. See Stephen's *Hist. of Crim. Law.*

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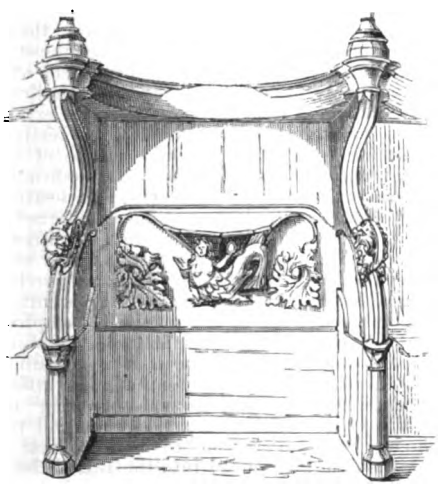
Miseno, a promontory forming the western side of the Bay of Pozzuoli (*Cumæ*), 10 miles SW. of Naples. On it are ruins of the ancient city of Misenum, which Augustus made one of the principal stations of the Roman fleet.

Misereré, the name by which, in Catholic usage, the 50th Psalm of the Vulgate (51st in Authorised Version) is commonly known. It is one of the so-called 'Penitential Psalms,' which are said after Lauds on the Fridays in Lent, except Good Friday. It has been commonly understood to have been composed by David in the depth of his remorse for the double crime which the prophet Nathan rebuked in the well-known parable (2 Sam. xii.). Another opinion, however—plainly stated by Theodore of Mopsuestia (died 428), and adopted by many moderns—attributes this psalm to some of the psalm-writers of the Captivity; whilst others, again, hold that the last two verses only were added after the return from the Exile.

Miserere, a projection on the under side of the seats of the stalls of mediæval churches and chapels, &c. They are usually ornamented with



Miserere.

carved work, and are so shaped that when the seats-proper are folded up they form a small seat at a higher level, sufficient to afford some support to a person resting upon it. Aged and infirm ecclesiastics were allowed to use these during long services.

A Frate della Misericordia.

Misericordia, or MISERICORDE ('mercy'), a narrow-bladed dagger used by a knight in giving the *coup de grâce* or finishing stroke to a wounded foe.—Misericordia is also the name of a society (of laymen) in Florence, founded in the 13th century, who tend the poor sick, carry victims of accident or disease to the hospitals, and the dead to their burial. Members of all classes of the community, including the highest, are enrolled in this charitable association; and their sombre and forbidding costume—a dark monastic dress, with the cowl pulled down over the face so that the eyes merely peep through little holes—is not assumed because the Frati della Misericordia are penitents, but to check demonstrations of gratitude to the individual brethren.

Mishmee Bitter. See COPTIS.

Mishna (from Heb. *shana*, 'to learn;' erroneously held to designate Repetition) comprises the body of the 'Oral Law,' or the juridico-political, civil, and religious code of the Jews; and forms, as such, a kind of complement to the Mosaic or Written Law, which it explains, amplifies, and immutably fixes. It was not, however, on the authority of the schools and the masters alone that these explanations, and the new ordinances to which they gave rise, depended, but rather on certain distinct and well-authenticated traditions, traced to Mount Sinai itself. The Mishna (to which the Toseftas and Boraithas form supplements) was finally redacted, after some earlier incomplete collections, by Jehudah Hanassi, in 220 A.D., at Tiberias. It is mostly written in New Hebrew, and is divided into six portions (Sedarim): 1. Zeraim (Seeds), on Agriculture; 2. Moed (Feast), on the Sabbath, Festivals, and Fasts; 3. Nashim (Women), on Marriage, Divorce, &c. (embracing also the laws on the Nazirship and Vows); 4. Nezikim (Damages), chiefly civil and penal law (also containing the ethical treatise Aboth); 5. Kadashim (Sacred Things), Sacrifices, &c.; description of the Temple of Jerusalem, &c.; 6. Taharoth (Purifications), on pure and impure things and persons. See also EXEGESIS, Vol. IV. p. 497; TALMUD.

Misiones, an Argentinian territory, lies between the Uruguay and the Paraná, and is bounded on all sides but the SW. by Brazil and Paraguay. Area, 20,823 sq. m.; pop. 30,000—though before the expulsion of the Jesuits (1767) it exceeded 100,000. There are three low mountain-chains radiating from the centre. The greater portion of the surface is covered with forest, producing building and dye-woods, oranges, medicinal herbs, and the *yerba maté*. Maize is largely grown, and sugar-cane to some extent; of late years several sugar-houses have been erected. Capital, Posadas (pop. 3000), on the Paraná.

Miskolcz, a town of Hungary, 113 miles by rail NE. of Pesth. Pop. 24,319.

Misprision. See TREASON.

Misrepresentation, a false statement affecting the validity of a contract or transfer of property. Wilful misrepresentation is the same as Fraud (q.v.). Innocent misrepresentation affects the formation of a contract in cases where one party has to rely on statements made by the other. An insurance company grants a policy in reliance on the statements made by the insured; a purchaser of land must rely on statements made by the vendor; an applicant for shares in a company relies on the truth of the prospectus. In these cases even unintentional misrepresentation will prevent the party responsible for it from enforcing the agreement against the party who has been misled. There are also cases in which a party is taken to warrant the truth of his statement; in these cases even an innocent misstatement may give the other party a right to be discharged altogether, or a right to claim damages for breach of warranty.

Missal, the volume containing the prayers used in the celebration of the Mass. Anciently, considerable variety in minor details prevailed among the books in use in different countries, and even in different churches of the same country. With the view of restoring uniformity, the pope, in virtue of a decree of the Council of Trent, in 1570 ordered that all churches which had not, for a clearly ascertained period of 200 years, enjoyed an uninterrupted use of a peculiar service-book of their own, should

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thenceforth adopt the Roman Missal. Of this exemption several churches in Germany, France, and even in Italy availed themselves; but in later times the great majority have conformed to the Roman use. The Roman Missal has twice since that date been subjected to revision and correction —in 1604 by Clement VIII., and in 1634 by Urban VIII. The latter recension still continues in use. The missals of the oriental rites differ from that of the Roman Church, each having for the most part its own proper form. See LITURGY.

Missions. The truth and divine origin of Christianity being assumed, it might have been expected that missions to propagate the faith should have been carried on continuously till the world was evangelised, and that that goal should have been reached long ere now. It has not been so. There have been long periods of intermission, during which the work either ceased, or was prosecuted without zeal or energy; and others during which abundant zeal was neutralised by a strange lack of discretion. In point of fact there have been but three periods in the history of the Church which have been distinctively marked as missionary periods, and a history of missions would be fairly complete if it gave an account of (*a*) the apostolic and immediately post-apostolic; (*b*) the mediæval; and (*c*) the modern missions.

(*a*) *Missions of the Apostolic and immediately subsequent Ages.*—It is certain that the gospel made great progress during the lifetime of the apostles. From the 'Acts of the Apostles' it is manifest that within a few years of the resurrection of Christ the gospel obtained a footing in most countries to the east and the north of the Mediterranean; while from other authentic sources we learn that in the same brief period it was successfully introduced into Egypt and the other African regions on the southern shores of that sea. Neither Gibbon, in his estimate of the effects of 'secondary causes,' nor the orthodox apologists who criticised that estimate, nor writers of the history of missions in our day appear to estimate highly enough, as contributing to the production of this result, the labours of those Hellenistic Jews and proselytes of whose conversion to the faith we read in the second chapter of the Acts. While there were in Jerusalem tens of thousands of Jews who had never left the precincts of the Holy Land, and who knew no language but the Hebrew of their Scriptures and the Aramaic dialect into which it had degenerated, no mention is made of them as witnesses of the miracle of the gift of tongues, but only of the Hellenistic Jews and proselytes who had come for the observance of the great feast from numerous Asiatic, African, and European lands, and from the remote isles of the sea. Of these three thousand were baptised. They thenceforth constituted a 'native agency' for conveying the message of the gospel into their several lands, and telling of 'Jesus Christ and Him crucified' in the vernacular speech of these lands. But they needed training for this work, and remained for a time under the teaching and fellowship of the apostles. As the result of 'the persecution which arose about Stephen,' 'they were all scattered abroad, except the apostles,' and 'they that were scattered abroad went everywhere, preaching the word.' It must have been through the labours of these evangelists, under the direction of the apostles, that Christian churches were founded in many places remote from Jerusalem—as, for example, at Damascus, where we find a church of such importance as to warrant the employment of the arch-persecutor for its suppression.

As to the personal labours of the apostles we have no reliable information outside the book of the Acts. There are innumerable churches that claim the honour of apostolic foundation; but their claims rest on traditions which cannot be traced beyond the 13th, the 12th, or, at most, the 11th century. There are, indeed, two exceptions, that relating to the foundation of a church in the kingdom of Edessa by Thaddeus, and that which ascribes the introduction of the gospel into India to the apostle Thomas. The authorities for these are apocryphal 'acts,' which are certainly of an early date. The books contain multitudes of mistakes and anachronisms, and cannot be regarded as historical authorities; but they wear the aspect of a misapprehension of actual facts and occurrences, rather than that of pure invention. A greater amount of probability than is usually assigned to it appears to belong to the apostolic origin of the Syrian Church in Southern India (see THOMAS, ST).

We have no sufficient data from which to estimate the rate of the progress of the gospel during the apostolic age. From such data as exist statists have estimated the number of Christians existing at the death of the apostle John, or at the close of the first Christian century, at numbers varying from less than a quarter of a million to more than half a million. It were not safe to assume that the actual number was a mean between these two extremes, or even that it lay between them at all. It may possibly have been below the smaller, or, equally possibly, above the greater. Certainly, however, the number was large. The testimony of Tertullian to this effect would not be of much value if it stood alone. But from it, confirmed as it remarkably is by the unexceptionable testimony of the younger Pliny, it cannot but be inferred that within a century of the resurrection of Christ the gospel had been preached over a great part of the Roman world, and that at least in some provinces, as in Bithynia, the gospel was threatening to supersede the worship of the gods of the empire.

(*b*) *Mediæval Missions.*—Apart from missions in the technical sense of the term, it is certain that various causes contributed to the wide diffusion of a knowledge of the gospel. Setting aside some altogether untrustworthy legends and traditions, we find no reason to believe that the gospel was first introduced into the British Islands by apostles or apostolic men, or by missionaries specially set apart for the work; and yet it is certain that before the time of Constantine there were churches of considerable extent both in the southern and the northern sections of Britain. The most probable supposition is that these churches owe their origin to the intercourse of Britain with Rome, which began with Cæsar's invasion, and soon attained a great extent. Soldiers and civilians came from Rome to Britain, some of whom were Christians, while others brought with them Christian slaves. British merchants went to Rome as traders, British chieftains as diplomatists, British ladies as hostages. There is some reason to believe that one of the last class was a friend of Paul during his imprisonment there. But if the British Church did not owe its origin to missionaries in the strict sense of the term, it is its proud distinction to have been the greatest missionary church throughout the earlier of the mediæval centuries. If Patrick really was a Briton, as seems demonstrable, he was the great leader of the British missionary host. He found Ireland entirely heathen, and he lived to see it professedly Christian. During his lifetime it was changed from a condition of barbarism into a land of saints and a land of scholars, in whose schools were trained not only the choicest youths of the neighbouring Britain, but many also from the continent of Europe. The debt that

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Ireland owed to Scotland for the mission of Patrick she nobly repaid by the mission, just a century later, of Columba and his associates to Iona. The religion imported probably in a casual way by Roman soldiers and Roman civilians and Roman slaves, and by British sojourners in Rome, had not died out, but it had not become widespread. The Picts were uncivilised and unevangelised. It was from the sequestered I or Iona that the light went forth which shone brightly for many generations—all the more brightly by reason of the depth of the darkness which it had to penetrate. If the Scottish Patrick might fitly be called the apostle of Ireland, and the Irish Columba in some sort the apostle of Scotland, Aidan, one of the Iona 'family,' is entitled in like sort to be regarded as the apostle of Northumbria; and St Cuthbert was a spiritual descendant of Aidan. Moreover, the Irish-Scottish missionaries were the great evangelists of a large part of the European continent. Ebrard has shown the magnitude and the importance of the work undertaken and accomplished by Columbanus and Gallus and a host of others, 'numerous as swarms of bees,' who, in the midst of innumerable difficulties, introduced agriculture and civilisation, learning and religion, into France and Switzerland and Italy and Germany, of which last country the English Boniface became the 'apostle.' Not that the externals of Christianity were non-existent at an earlier time. In France, for example, these noble missionaries had to do with the religion introduced by the Romans; but the pure faith was now represented by a corrupt clergy ministering to dissolute nobles and neglecting an enslaved people. Then they had to do with the recent invaders, who were partly heathen and partly Arian. Sad to say, the missionaries seem to have suffered less from the heathens than from the Arians, less from the Arians than from the orthodox, and, among the orthodox, less from the peasantry than from the nobles, and most of all from the clergy, or from others at their instigation.

What the Irish and Scots did for Europe in the earlier middle ages the Nestorians about the same time attempted, with no less zeal, though with less success, for Asia. Condemned as a heretic by a council held at Ephesus in the 5th century, Nestorius (q.v.) was banished from Constantinople to Egypt. From that time onwards, for five centuries the Nestorians carried on extensive and not unsuccessful missionary operations in central Asia, and founded churches, some of which exist in a languishing condition to this day, whilst others recognised papal authority in the later mediæval centuries. The Nestorian Tartar Church seems to have subsisted under a succession of ecclesiastics (see PRESTER JOHN) until the country was devastated by Genghis Khan. The Nestorians either introduced the gospel into India, or else revived a church previously founded, possibly by the apostle Thomas. There can be no reasonable doubt that in the 7th century they passed through Tartary into China, that they founded churches there, that they were at least tolerated and probably subsidised by successive emperors till the end of the 9th century, when, with a revolution or change of dynasty, the system of intolerance was introduced.

In the later mediæval centuries the missionary work was mainly in the hands of the great Roman orders, the Dominicans (q.v.) and the Franciscans (q.v.), especially the latter. Their work was chiefly among the Mussulmans of Spain, North Africa, and western Asia. Las Casas (q.v.) earned the title of 'apostle of the Indians.'

(*c*) *Modern Missions.*—The Jesuit order was formed immediately after the Reformation, avowedly for the purpose of retrieving the disaster which that great event had caused to the Church of Rome. By far the most distinguished of the early Jesuit missionaries was Francis Xavier (q.v.). Unquestionably Xavier was no ordinary man; it is, however, evident even from the eulogies passed on him by his admirers that he did not make any spiritual impression on the minds of the people of India and Japan, though he consolidated the Portuguese mission in India and helped to open China and Japan to missionary effort. After the labours of Ricci and Schall there are said to have been in China 300,000 Catholics in 1663. For the Jesuit 18th-century missions in Paraguay, see JESUITS, PARAGUAY. Notes on the Catholic missions in Japan and Corea will be found in the articles on these countries. There is a separate article on the Propaganda (q.v.). The *Missiones Catholicæ* states that the number of European missionaries belonging to the Roman Catholic Church in 1886 was 2800, of mission adherents nearly 2,800,000; in India there being 1,180,000, in Indo-China over 500,000, nearly 500,000 in China, 210,000 in Africa, and over 100,000 in Oceania.

The Reformation was a great preparation for evangelistic work, but the Reformation period was not distinctively a missionary period. This was not merely, though it might be in part, because the hands of the Reformers were full of the work which they had to do at home. It is to be remembered that the nations which had foreign relations, foreign traffic, and foreign possessions were Spain and Portugal, in which the Reformation got no firm hold. But it must be admitted that the Reformers did not rightly apprehend the commission to preach the gospel to every creature. When Luther, therefore, has occasion to refer to that text, he tacitly assumes that its requirement is fulfilled when the *gospel*, as distinguished from Romanism, is preached to the nations of Europe. In the 16th and 17th centuries, therefore, we find no more than sporadic and ill-sustained efforts after mission-work among Jews or heathens. Leibnitz, indeed, anticipated the conception of a later age, and may well be regarded as the harbinger of modern missions, even as, along with Newton, he is honoured as the harbinger of modern science. It was natural that the needs of the English colonies should first attract the interest of Englishmen to foreign parts; the life labours of John Eliot, 'the Indian apostle' (1604–90), were carried out under the auspices of the Corporation for the Spread of the Gospel in New England. The Hon. Robert Boyle, first governor of that society, contributed to the translation of the gospels into Malay, and left a bequest for foreign missions. Bishop Berkeley laboured for the foundation of a missionary college in Bermuda; and it was mainly for the spiritual wants of the American colonies that the Society for the Propagation of the Gospel in Foreign Parts was founded in 1701; its first missionary to India sailed in 1818.

Early in the 18th century the first Protestant mission was sent to India. It was projected by the king of Denmark, having probably been suggested to him by his chaplain, Dr Lütkens. At first, and for a long time, Germany supplied the missionaries; but the pecuniary support of the mission soon devolved upon England, Prince George of Denmark, the husband of Queen Anne, having recommended the object to the Society for Promoting Christian Knowledge. Among many noble men who have been engaged in this mission the most notable is Schwartz, who probably obtained an influence over all classes of the people of India such as no other European ever possessed.

While all the Protestant churches of Europe and America are now engaged in missionary work, there is one church which is distinguished from all

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the rest by this, that it is simply a missionary institute. Other churches make their missionary work subordinate to their pastoral functions; the Moravians or *Unitas Fratrum* have long regarded the conduct of missions as the end of their being. There is not in the history of human enterprise a more interesting chapter than that which relates the missionary works of the Moravians from their first beginnings in St Thomas and in Greenland to their latest undertaking in the Tibetan Himalayas.

To William Carey belongs the high distinction of having been the first to inculcate effectually upon British Protestants the duty and the privilege of missions, and the first English Protestant to engage personally in the work. He and his coadjutors were noble men, and had to contend not only with heathen prejudices, but also with the timid policy of the rulers of India. The battle which fell to them to fight had to be fought once for all; and it is due to their singular discretion and their inflexible determination that it was fought so well. These men made Serampore a classic spot, and amid all the changes, material and spiritual, which have come over India in these last years, and the greater changes which a near future will certainly effect, the names of Carey and Marshman and Ward will be held in ever-growing veneration. Carey went to India in 1793; Henry Martyn's labours lay between 1805 and 1812. In 1795 the London Missionary Society was formed, and began its work by the despatch to the South Seas of the ship *Duff* with a large body of missionaries. For a long time the mission was not successful; but after a time it met with great success, and now there are many of the islands in which heathenism has long been extinct. The London society cordially welcomed numerous fellow-labourers from England, Scotland, Germany, and America, and most generously consented to a division of the islands which they could not have been much blamed if they had claimed as their own. It may be noted in passing that these small islands have contributed to a disproportional extent to the enrichment of missionary literature. It is part of the common creed of mankind that truth is stranger than fiction, but is not generally so attractive. Yet in our day there have not appeared more fascinating books than Williams's *Missionary Enterprises*, Miss Yonge's life of Bishop Patteson, and Mr Paton's narrative of his own work and that of his brethren in the New Hebrides.

The societies of the Church of England are the Society for the Propagation of the Gospel, High Church (1701), and the Church Missionary Society (1799). The English Nonconformists are represented in the mission-field all over the world by agents of the London (1795), the Baptist (1792), and the Wesleyan Missionary Societies (1817). The Americans are not behind in the good work. The American Board of Missions (1810) and the American Presbyterian Board are great organisations, whose agents are doing most effective work in many fields; while the Baptists have good reason to rejoice in their Burmese Mission (1813). The Methodist Episcopal Church came more recently into the field (1819), but set about its work with characteristic energy. Zenana missions are a special department of Indian missions. The efforts of the Salvation Army (q.v.) in the foreign field deserve mention. Missions to the Jews have a peculiar interest for many Christians; and home missions are an integral part of church work at home.

The Evangelical body in Germany is, in proportion to its strength, most creditably evangelistic. By means of many institutions they have trained and sent forth a large number of missionaries, some of whom have been men of extensive scholarship, but the greater proportion men of earnest piety, able and willing to endure hardness, as good soldiers of Jesus Christ. The Rationalistic party in Germany have not shown much zeal in the mission cause.

The Scottish missions differ from the others in this, that they are conducted by the churches as such, without the intervention of societies. The Established, the Free, and the United Presbyterian Churches have extensive missions in India, Africa, China, the South Seas, and Japan. The English Presbyterian Church has an extensive and successful mission in China. The Presbyterian bodies cherish the memories of Duff and Wilson and Anderson in India, and of William Burns and Carstairs Douglas in China.

The following table, based on the calculations of the American Board, will give an idea of the extent of Christian missions (other than Roman Catholic) in 1889.

Countries.	Societies or Churches.	Missionaries.	Christians.	Income in £ Sterling.
Great Britain	23	2658	1,361,028	£932,156
America	30	2127	742,832	781,393
Germany and Switzerland	17	559	344,769	142,423
Other European Countries	8	96		23,427
Total	78	5440	2,448,629	£1,879,399

The Church Missionary Society's income is more than twice that of any other English society.

The mode of carrying on missionary operations by the various bodies is essentially one, though, of course, modified by circumstances. Of recent years 'medical missions' have been found to be a valuable, and in some cases an indispensable, adjunct to the other agencies. The missions of the Scottish churches have employed education as an evangelistic power to a greater extent than the other bodies. Such institutions as the Christian College at Madras, the mission station at Blantyre, and the Free Church Institution at Lovedale in South Africa are producing a great effect on the minds of the people.

The success of missionary work in our day is not such as either to elate or to discourage the friends of missions. The actual population of the world may be taken as fifteen hundred millions, of whom about four hundred millions are professedly Christians. Thus, not so much as a third part of the world is evangelised. But then it should be considered that an immense amount of preparatory work has been accomplished; and also that great national movements often reverse in a few years the aspect of affairs. In our own time we have seen such reversals in Madagascar and the Fiji Islands and Japan. In China we have seen a change, in the freedom with which the gospel can be preached, which our fathers, and indeed ourselves at one time, would have considered simply impossible. All are convinced that in India there must come ere long a mighty change; and the friends of the gospel earnestly hope that that change will be favourable to the cause of Christ.

Some account of mission operations are given in the articles on the countries where missions have had conspicuous success (FIJI, JAPAN, &c.); there are also biographical notices of the most eminent missionaries (ELIOT, CAREY, LIVINGSTONE, DUFF, HANNINGTON, &c.). See also works on missions by Marshall (1863), Rufus Anderson (Yew York, 1869), R. Grundemann's *Missions-atlas* (Gotha, 1867–70; and Calw, 1884), Christlieb (2d ed. 1880), Young (1881), P. Joung (New York, 1883), H. Gundert (2d ed. Calw, 1886), Warneck (Eng. trans. by T. Smith, 1884), George Smith (1884; new ed. 1890); on Catholic missions, Henrion's *Histoire des Missions Catholiques*, and Durand's *Missions Catholiques Françaises;* works on special missions; the numerous missionary journals and year-books; and the lives of the notable

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missionaries. Buddhism (q.v.), especially in its earliest period, and Mohammedanism (q.v.) have been grouped with Christianity as missionary religions, in contradistinction to Judaism, Zoroastrianism, and Brahmanism. See Max-Müller's papers on missions in *Chips from a German Workshop*, vol. iv.

Mississippi, one of the Gulf States of the American Union, lies west of Alabama and south of western Tennessee, and is bounded on the W. by the Mississippi River. Length, north to south, 335 miles; width, 150 miles. Area, 46,810 sq. m. The surface, except in the Yazoo delta, is generally hilly, though nowhere mountainous, the highest hills being only 800 feet above the sea-level. There are three distinct watersheds; the eastern counties are drained by the Tombigbee and its tributaries; the Pearl, Pascagoula, and Escatawpa with their affluents drain the central and south-eastern portion; and the Homochitto, Big Black, and Yazoo carry the water of the western and northern counties into the Mississippi. The Orange-sand formation (Post-Tertiary, 40 to 60 and even 200 feet thick) characterises the greater portion of the surface of the state, and forms the main body of the hills and ridges. It is usually coloured with hydrated peroxide of iron, or yellow ochre, and presents an endless variety of tints. Ferruginous sandstones, capping the tops of hills and thereby preventing denudation, are found in all sections covered by the Orange-sand formation. Gravel beds also abound, as well as beds of pipeclay, and of ochreous clays used for paints; and there are also vast beds of lignite of excellent quality, and marls which are used as ingredients of commercial fertilisers. There are mineral springs in different portions of the state.

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Mississippi is essentially an agricultural state. The north-eastern prairie region, 70 miles long and from 15 to 20 wide, with its fertile, black, calcareous soil, contains much of the best farming and grazing land in the state. There are no springs here, but cisterns dug in the rotten limestone, bored wells, and artesian wells furnish ample water. In the north the bottom lands along the numerous creeks and rivers especially are well adapted to agriculture; while in the central portion stock-raising is carried on, and in the yellow-pine region large herds of sheep are raised. The yellow pine ranks first among the forest trees of Mississippi; it extends northward from the coast for 150 miles. The *Yazoo Delta*, embracing the elliptical area of alluvial bottoms between the Mississippi and Yazoo rivers, extending from Vicksburg to the state line on the north, has until within recent years been subject to inundations; but levees now protect the lands, and the rise in the Mississippi in 1890—the highest and most prolonged ever known—left the levees unbroken except in four places which together were less than a mile in extent. Less than 15 per cent. of the delta was overflowed. The delta's drainage flows into lakes, small but numerous, which form the head-waters of other bayous, and through them after miles of meandering find outlets into the Yazoo and other streams. The delta contains 4½ millions of acres of alluvial land, only 500,000 acres of which are under cultivation. Virgin forests of hardwoods cover the rest. For the state, the annual production of cotton is about 900,000 bales, of corn 28,000,000 bushels, and of oats 4,000,000 bushels. The fruits and vegetables shipped in 1890 were valued at $1,000,000. This industry flourishes in the central and southern portions.

The winters in Mississippi are short and mild, the mean temperature 45° F.; the summers are devoid of intense heat, the mean 81°, seldom reaching 100°. Ice from one to two inches thick forms in the northern part of the state. The elevation of the surface and the Gulf breezes render the climate delightful during most of the year. The annual rainfall ranges from 48 to 58 inches. The death-rate is very low—12·9 in 1000.

Mississippi sends seven representatives to congress. The state legislature is composed of 145 representatives and 45 senators, elected quadrennially. There are three supreme judges, appointed for nine years by the governor, and circuit and chancery judges, appointed for four years. The public schools are maintained four months annually by the state, but forty towns and cities maintain graded schools for ten months a year. Separate schools are maintained for the coloured race. There are enrolled 148,435 white and 173,552 coloured children: average daily attendance—white, 90,716; coloured, 101,710. The state supports the university at Oxford (1844), agricultural and mechanical college at Starkville (1878), industrial institute and college at Columbus (1884; for white girls), a college for coloured youth at Rodney, and a normal school at Holly Springs, for training coloured teachers. There are also private universities and colleges, for both white and coloured youth, besides 155 high schools and academies. Institutions for the deaf and dumb (100) and the blind (50) are at Jackson, the capital; there also are the state penitentiary (500) and the lunatic asylum (550).

History.—Mississippi was first settled by the French, and constituted a part of Louisiana. Iberville planted the first colony at Biloxi in 1699. It was ceded to Great Britain in 1763; was admitted into the Union as a state, December 10, 1817; seceded January 9, 1861 (principal battles during the civil war, Corinth, Baker's Creek, Holly Spring, Iuka, siege of Vicksburg); was readmitted into the Union, 1869. In 1890 there were 2475 miles of railway in the state. Vicksburg, Greenville, and Natchez are principal ports on the Mississippi River, and Pascagoula and Biloxi on the Gulf. Cotton-factories are located at Wesson (value 3 millions), Columbus, Natchez, Enterprise, Meridian, Water Valley, Carrollton, and Corinth; wood-factories at Jackson and Meridian. Pop. (1820) 75,448; (1850) 605,948; (1880) 1,131,597; (1890) 1,289,600.

Mississippi-Missouri. The Mississippi River (Algonkin *Missi Sipi*, 'Great River'), the largest river of North America, is, with its tributaries, wholly within the boundaries of the United States. It drains most of the territory between the Rocky and Alleghany Mountains, embracing an area of 1,257,545 sq. m., or more than two-fifths of the area of the United States. This basin includes the minor basins: Lower Mississippi, 65,646 sq. m.; Red River, 92,721; Arkansas, 184,742; Missouri, 527,690; Upper Mississippi, 179,635; Ohio, 207,111. Besides the four tributaries here named, there are forty-one others navigable; and 200 more of moderate size. The total length of the Mississippi is 2960 miles, of which 2161 are navigable; but the Missouri affluent (see below) is longer than the Upper Mississippi, and with the lower river gives a total of 4200 miles. The total navigable waters amount to 16,090 miles.

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The source of the Mississippi is Lake Itasca in the north-west central part of Minnesota, about 7 miles long by 1 to 3 wide, which has, however, several feeders, the principal being Elk or Glazier Lake. The remotest springs of Itasca rise in 47° 34′ N. lat. and 95° 20′ W. long., and are 1680 feet above sea-level. As it issues from this lake the Mississippi is about 12 feet wide and 18 inches deep. Through pine-forests and swamps for hundreds of miles it winds from lake to lake, with frequent rapids and picturesque falls, until, 1200

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feet wide, at the city of Minneapolis it plunges over the Falls of St Anthony. This point is the head of river-navigation, though in various reaches above small steamboats ply. After receiving the St Croix, the Mississippi becomes the boundary between the states of Minnesota, Iowa, Missouri, Arkansas, and Louisiana on the right, and Wisconsin, Illinois, Kentucky, Tennessee, and Mississippi on the left. Its frequent rapids within Minnesota are due to the granite bed, but sandstone prevails farther down, to Rock Island, Illinois. On the Wisconsin boundary the river expands into Lake Pepin, and thereafter, fully a mile wide, flows between bluffs 200 and 300 feet high, and sometimes through dense forests. At Rock Island there are rapids with 22 feet of fall, and 125 miles farther down are the Des Moines rapids with 24 feet of fall. Around these obstructions to navigation the United States government has constructed ship-canals. The entrance of the turbid Missouri produces a marked change in the character of the river; for several miles the diverse waters refuse to mingle, the Missouri's muddy tribute taking the right bank and the Upper Mississippi's clear stream the left. When the union is complete, the whole river has henceforth a light yellowish colour, modified somewhat by the Ohio's greenish water and more by the reddish water of the Arkansas and Red. From the mouth of the Ohio the trough of the Mississippi is about 4470 feet wide, but as it approaches the Red it is narrowed to 3000 feet, and at New Orleans is 2500 feet. The usual depth of the channel southward from the Ohio is from 75 to 100 feet, and its surface is sometimes higher than the country beyond its banks. In fact, from the Missouri to the Gulf the Mississippi rolls in serpentine course through vast alluvial tracts or 'bottoms,' whose width varies from 30 to 150 miles. Their total area, including those along tributary streams, is variously estimated from 29,790 to 41,193 sq. m. Though of unsurpassed fertility, scarcely one-tenth of these lands are cultivated owing to the dangers of the annual overflow. The melting of the ice and snow in the upper basin swells the lower current from March to June. Levees or embankments, largely built by the government, now extend for more than 1600 miles. Between the Ohio and the Red rivers extraordinary floods, rising from 47 to 51 feet, occur about once in ten years, making 'crevasses' in the levees, and doing immense damage. In these great floods the river has been known to spread over a tract of 150 miles. Below the Red River the waters are discharged through numerous 'bayous' into the Gulf of Mexico. The main channel runs south-eastward, and finally divides into five or six passes, the principal being the south, the north-east, and the south-west; the last is in 28° 58·5′ N. lat. and 89° 10′ W. long.

The mean velocity of the Lower Mississippi is 2½ miles per hour. The yearly discharge into the Gulf is nearly 145 cubic miles; the sedimentary matter carried with this would form a prism 1 mile square and 263 feet high, while the amount pushed along the bottom of the channel would make another 1 mile square and 27 feet high. These vast deposits and the constant changes caused by floods tend to embarrass the entrance to the great river. To keep an open channel, at least 20 feet deep, Captain Eads (q.v.) contracted with the United States government to erect and maintain a system of jetties at the South Pass. The construction was begun in 1875, and has proved highly successful, a depth exceeding 30 feet having been maintained. The mouth of the Mississippi is essentially tideless.

The principal cities on the great river are Minneapolis, St Paul, La Crosse, Dubuque, Keokuk, Quincy, Hannibal, St Louis, Memphis, and New Orleans, at several of which the river is crossed by railway bridges. The steel bridge at St Louis is the most southern, besides which another was connected at the same city in 1890.

See Humphrey's and Abbot's *Physics and Hydraulics of the Mississippi River* (Phila. 1861), and *Commerce and Navigation of the Mississippi* (Washington, 1888).

Missouri River ('Big Muddy'), the principal branch of the Mississippi River, is formed by the confluence of the Jefferson, Gallatin, and Madison rivers, at Gallatin City, Montana, 4132 feet above the sea-level. These rivers rise in the Rocky Mountains, close to the sources of the Columbia and Colorado rivers, and to the Continental Divide. The Madison has the remotest source in a small lake of the same name in Yellowstone National Park in Wyoming, 44° 19′ N. lat. and 110° 50′ W. long., at an elevation of 7632 feet. This river flows north-west and north to the junction of the Three Forks. The Missouri then flows northward, skirting the main range of the Rocky Mountains, and, after passing through a gorge called 'The Gate of the Mountains,' turns to the north-east and reaches Fort Benton, the head of navigation, 225 miles from Gallatin City. About 40 miles above Fort Benton are the Great Falls, where the river descends 327 feet in 15 miles by a series of cataracts, the highest having a perpendicular fall of 87 feet. From Fort Benton the course is easterly, the river being flanked by bluffs about a mile apart until it passes the rapids 400 miles below, when the valley opens to a width of 10 miles. The Milk River is its first large tributary, but at the boundary of North Dakota the still larger Yellowstone joins it. The Yellowstone also rises in the National Park, and flows at first over cataracts and through cañons until it emerges in a more level country. It is 1152 miles long, and has the general characteristics of the Missouri. From its junction, which is the head of navigation in the low-water season, the Missouri flows through North Dakota, east and then south-east to Bismarck (1610 feet above sea-level), where it is crossed by the splendid bridge of the Northern Pacific Railroad. Through South Dakota the south-easterly course continues to Sioux City, whence flowing south the river becomes the boundary between Nebraska and Kansas on the right and Iowa and Missouri on the left. On receiving the tributary Kansas the stream turns to the east, and flowing across the state of Missouri pours its muddy waters into the channel of the Mississippi, 20 miles above St Louis. The Missouri is 3047 miles long, of which 2682 are called navigable, but owing to its tortuous, treacherous, and obstructed channel navigation is attended with great risks. The growing cities on its banks forsake the use of the river for commercial purposes and depend on the railways. In 1866 there were seventy-one steamers in active service in that part within the state of Missouri, but twenty years later the number had diminished to seven steamers and three tow-boats. The chief towns on the banks are Bismarck, Yankton, Sioux City, Omaha, Council Bluffs, Nebraska City, St Joseph, Atchison, Leavenworth, and Kansas City.

Mississippi Scheme, projected in France by John Law (q.v.) of Lauriston in 1717, proposed to develop the resources of the province of Louisiana and the country bordering on the Mississippi. The company, incorporated as *Compagnie des Indes Occidentales*, started with a capital of 200,000 shares, of 500 livres each. Shares were eagerly bought; and when, in 1719, the company obtained the monopoly of trading to the East Indies, China, the South Seas, and all the possessions of the French East India Company, the brilliant vision opened up to the public gaze was irresistible. The

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Compagnie des Indes, as it was now called, created 50,000 additional shares, but a rage for speculation had seized all classes, and there were at least 300,000 applicants for the new shares, which consequently went up to an enormous premium. The public enthusiasm now rose to absolute frenzy, and Law's house and the street in front of it were daily crowded with applicants of both sexes and of all ranks; and while confidence lasted a factitious impulse was given to trade in Paris. But the regent had meanwhile caused the paper circulation of the national bank to be increased as the Mississippi stock rose in value, and many wary speculators, foreseeing a crisis, had secretly converted their paper and shares into gold, which they transmitted to England or Belgium for security. The increasing scarcity of gold and silver becoming felt, a general run was made on the bank. The Mississippi stock now fell considerably, and despite sundry desperate efforts, which were attended with momentary success, to keep up its credit, it continued to fall steadily and rapidly. In February 1720 the National Bank and the *Compagnie des Indes* were amalgamated, but, though this gave an upward turn to the share-market, it failed to put the public credit on a sound basis. Several useless attempts were made by Law, now controller-general of the finances, to mend matters; and those suspected of having more than a limited amount (fixed by a law passed at the time) of gold and silver in their possession, or of having removed it from the country, were punished with the utmost rigour. The crisis came at last. In July 1720 the bank stopped payment, and Law was compelled to flee the country. A share in the Mississippi Scheme now with difficulty brought twenty-four livres. An examination into the state of the accounts of the company was ordered by government; much of the paper in circulation was cancelled; and the rest was converted into 'rentes' at an enormous sacrifice. See LAW (JOHN), and books there cited.

Missive, in Scotch law, is a memorandum.

Missolonghi (*Mesolongion*), a seaport town of Greece, in the nomarchy of Ætolia, on the northern shore of the Gulf of Patras, 24 miles W. of Lepanto. A modern place, built on a swampy flat, it is chiefly memorable for the two sieges which it underwent during the war of independence. In 1821–22 it was vainly invested for three months by land and sea by the Turks; in 1825–26 it was again besieged by an overwhelming Ottoman force, and, after ten months of resistance and suffering, its garrison, reduced from 5000 to 3000 fighting-men, cut their way through the ranks of the enemy, carrying with them a great number of the women and children. The Turks then entered the town, which was all but totally destroyed. There is a statue (1835) over the grave of Bozzaris, and another (1881) of Lord Byron, on the spot where his heart is interred. Pop. 6324.

Missouri, one of the central states, and the fifth in order of population, of the American Union, lies between 36° and 40° 30′ N. lat. and between 89° 2′ and 95° 51′ W. long., and occupies a commanding position in the Mississippi valley. It is 280 miles long from north to south, and gradually increases in width from 208 miles in the north to 312 miles in the south. Area, 68,735 sq. m., or nearly that of Scotland, Ireland, and Wales. The Missouri River divides the state into two unequal sections, designated 'North Missouri' and 'South Missouri' respectively. That part of the state lying north of the Missouri River is generally level or slightly undulating, consisting of rolling prairies and level bottom lands, diversified with a luxuriant growth of timber along the streams. The southern section has a more diversified surface, deriving its distinctive features from the Ozark Mountains, which cover about one-half of this division. These mountains enter the state from north-western Arkansas, and extend across the state to the Mississippi River; throughout the greater part of their length they may very properly be classed as tablelands, reaching their highest altitude (1500 feet) in Greene and Webster counties, and gradually breaking up into narrow ridges, spurs, knobs, and peaks farther east. The entire eastern limit of the state is washed by the Mississippi River, with a water front of 560 miles, while the Missouri River forms the boundary from the extreme north-west corner to Kansas City, and thence across the state to the Mississippi, with which it unites just above St Louis. Many smaller tributaries flow into these two majestic rivers—into the Mississippi the Fabius, Salt, Cuivre, Meramec, St Francis, Current, and Black; and into the Missouri the Nodaway, Platte, Grand, and Chariton on the north, and the Osage and Gasconade on the south. The general drainage of the surface is indicated by long gentle slopes toward the Mississippi and Missouri rivers, except in the extreme south-west, where the streams flow into the Arkansas. The climate is genial, agreeable, and healthful. All the extremes of heat and cold peculiar to this latitude are experienced; but the mean annual temperature is about 54°, and the mean average rainfall is 41 inches.

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Missouri is pre-eminently an agricultural state. Of the 44,000,000 acres of her land surface more than 42,000,000 are adapted to agricultural and horticultural purposes. The soils are rich, deep, and unsurpassed in variety and productiveness. The principal crops are Indian corn (200,000,000 bushels), oats (30,000,000 bushels), wheat (28,000,000 bushels), potatoes, rye, barley, hemp, flax, cotton, sorghum, buckwheat, and hay (1,600,000 tons). Of tobacco a fair crop is 15,000,000 lb.; and orchard products are grown in great abundance. In the decade 1880–90 there was a great increase in the number of grazing animals, though sheep are not largely raised. The immense quantities of dressed beef and pork shipped annually to home and foreign markets are constantly increasing.

The mineral resources of Missouri are exceedingly rich, comprising extensive coalfields, that cover more than 20,000 sq. m.; also vast deposits of iron ore, lead, and zinc; while copper, cobalt, nickel, fireclays, fine marble, granite, and limestone of excellent quality abound in different localities. The coalfields are capable of yielding 100,000 tons of bituminous coal a day for several thousand years. The supply of iron ore is excellent in quality and inexhaustible in quantity; but the richest deposits yet worked are confined chiefly to two counties in the south-east—Iron and St François. Yet the iron belt south of the Missouri River, and extending from the Mississippi River on the east to Osage River on the west, covers an area of 25,000 sq. m. Excellent transportation facilities are afforded by the Mississippi River along the eastern border of the state, and by the Missouri River across the state; and the railroads are nearly 7000 miles in length.

Missouri returns two senators and 14 representatives to congress. The general assembly (34 state senators and 140 representatives) meets every two years. The public-school system is very complete and very efficient, embracing the state university, the school of mines, four state normal schools, and city, town, village, and country schools. All public schools are supported by state appropriations, local taxation, and interest on the state, county, and township school funds. Missouri has

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a larger permanent school fund than any other state of the American Union. The corps of teachers number 15,000. In addition to the state system of education there are 30 private academies, seminaries, denominational colleges, and universities, several of which are of a high order of excellence.

The metropolis of Missouri is St Louis (pop. 460,357), one of the greatest railroad, manufacturing, and commercial centres in the entire country. Next come Kansas City (132,043), St Joseph, Springfield, Hannibal, Sedalia, Chillicothe, Mexico, Moberly, Booneville, Nevada, Marshall, Kirksville, Carrollton, Lexington, and Carthage, all thriving cities. Pop. (1820) 20,845; (1840) 140,455; (1860) 1,182,012; (1880) 2,168,380; (1890) 2,677,080.

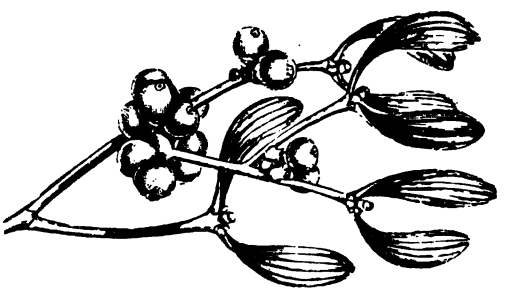
History.—Missouri was first explored by De Soto in 1541–42, and in 1673 Marquette and his followers visited its eastern border. It formed part of the 'Louisiana Purchase' (see LOUISIANA), the northern portion of which in 1805 was organised as the 'District of Louisiana.' It was not till 1812 that a part of this territory took the name of Missouri. In 1821 Missouri was admitted into the Union, but the present limits of the state were not established till 1836. Its admission was preceded by a long and bitter political controversy between the representatives of the North and South, the former resisting its entrance as a slave-state. The discussion resulted in the famous 'Missouri Compromise,' under which compact it was agreed that slavery should be for ever excluded from all that part of Louisiana north of 36° 30′ lat., except Missouri. During the four years of the great civil war the citizens of Missouri suffered terribly. The people were nearly equally divided in sentiment, and both sides prepared for the conflict. The state furnished 109,111 men for the Union army, and about three-fourths as many for the other side. Death and the destruction of property everywhere prevailed. But when the war ended the people commenced to build up the waste places; improvements were extended in all directions, bitter feelings soon died away, and the state entered upon an era of singular prosperity.

Missouri River. See MISSISSIPPI.

Mist. See FOG.

Mistassini, LAKE, in Labrador, some 300 miles N. by W. of Quebec, is strictly speaking an expansion of the river Rupert, which flows into the southern extremity of Hudson Bay. It is 100 miles long from north-east to south-west by 12 in average breadth.

Mistletoe. This mystic plant, with its thick, succulent, yellow-hued foliage, and white, viscous berries, was long a puzzle to botanists, its peculiar mode of growth having given rise to the most curious fancies. Its name is most probably from the Anglo-Saxon *mist-el*, from *mist*, 'mist,' 'gloom' (Ger., 'dung'), and *tán*, 'twig.' The only British species of this genus of parasitical shrubs is the Common Mistletoe (*Viscum album*), a native also of the greater part of Europe (not of north England, Scotland, or Ireland), growing on many kinds of trees, particularly on the apple, and others botanically allied to it, as the pear, service, and hawthorn; sometimes, also, on sycamores, limes, poplars, locust-trees, and firs, but very rarely on oaks (contrary to the common belief). In the Himalayas the mistletoe grows abundantly on the apricot-tree, on the vine and loranthus in Italy, on spruce-firs in France and Switzerland. The evergreen leaves of the *V. album* of English woods, with their yellowish hue, make a conspicuous appearance in winter among the naked branches of the trees. The flowers are insignificant, and grow in small heads at the ends and in the divisions of the branches, the male and female blossoms on separate plants. The berries are about the size of currants, white, translucent, and full of a very viscid juice, which serves to attach the seeds to branches, where they take root when they germinate, the radicle always turning towards the branch, whether on its



Mistletoe (*Viscum album*).

upper or under side. It may be easily made to grow on suitable trees even where not native—as in Scotland, for example.

The mistletoe was intimately connected with many of the superstitions of the ancient Germans and of the British Druids. In the northern mythology, Balder (q.v.) is said to have been slain with a spear of mistletoe; and in Holstein it is the Märentaken, or 'branch of spectres,' which confers upon its possessor the power to see ghosts. Among the Celts the mistletoe which grew on the oak was in peculiar esteem for magical virtues. According to an old tradition the mistletoe supplied the wood for the cross, which until the time of the crucifixion had been a forest tree, but was henceforth condemned to exist only as a mere parasite. Traces of the ancient regard for the mistletoe still remain in some old English Christmas customs, as kissing under the mistletoe. The mysterious surrounding of the mistletoe invested it with a widespread importance in old folklore remedies, the Druids having styled it 'all-heal,' as being an antidote for all diseases. Culpepper speaks of it as 'good for the grief of the sinew, itch, sores, and toothache, the biting of mad dogs and venomous beasts;' while Sir Thomas Browne alludes to its virtues in the cure of epilepsy. In Sweden a finger-ring made of the mistletoe is an antidote against sickness, and in France amulets made of its wood were formerly much worn (see H. Friend, *Flower-lore*).—*Loranthus Europæus*, a shrub very similar to the mistletoe, but with flowers in racemes, is plentiful in some parts of the south of Europe, and very frequently grows on oaks.—*L. odoratus*, a Nepalese species, has very fragrant flowers.—The American mistletoe, of which there are some half-dozen species, is similar in general appearance and habit to the European, yet differs in so many points as to justify its being called by a different name, Phoradendron. The commonest species is *P. flavescens*, found from New Jersey to Mexico.

Mistral (also *Mistraou* and *Maestral*), a north-west wind which at certain seasons of the year prevails on the south coast of France. Its approach is heralded by a sudden change of the temperature, from the most genial warmth to piercing cold; the air is felt to be purer, and more easily inhaled, the azure of the sky is undimmed by cloud, and the stars shine by night with extraordinary and sparkling brightness. The mistral then comes in sudden gusts, struggling with the local aërial currents, but its fast-increasing violence soon overcomes all opposition. In a few hours it has dried up the soil, dispersed the vapours of the atmosphere, and raised

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a dangerous tumult among the waters of the Mediterranean. The mistral blows, at intervals, with its greatest force from the end of autumn to the beginning of spring.

Mistral, FREDERICK, Provençal poet, was born a peasant's son near Maillaune (dept. Bouches-du-Rhone), on 8th September 1830, and studied law at Avignon; but for law he had no liking and went home to work on the land and write poetry, as Burns did before him. In 1859 he published the epic *Mirèio* (7th ed. 1884; Eng. trans. 1890), written in his native Provençal dialect. This charming representation of life in southern France made Mistral's name famous throughout the country, and gained for him the poet's prize of the French Academy and the cross of the Legion of Honour. It also led to the formation of the society called Lou Felibrige, which set itself to create a modern Provençal literature. In 1867 Mistral published a second epic, *Calendou*, and in 1876 a volume of poems entitled *Lis Iselo d'Or* ('Golden Islands'), songs steeped in the golden sunshine of the Mediterranean and its vine-clad shores. Since then he has written a novel, *Nerto* (2d ed. 1884), and issued a dictionary of the Provençal dialect (2 vols. 1878–86), the preparation of which occupied him many years. See an article by A. Daudet in the *Century* (1885).

Mistretta, a town of Sicily, near the north coast, half-way between Palermo and Messina. Pop. 12,235.

Mitau, the capital of the Russian government of Courland, on the right bank of the Aa, 27 miles by rail SW. of Riga. Founded in 1271 by the grand-master of the Teutonic Knights, and annexed to Russia in 1795, it has a castle, begun by Biron in 1738, and now the seat of the governor of the province, six churches, a museum, &c., with some very important manufactures, and a trade in grain and timber. From 1798 to 1807 Mitau offered an asylum to Louis XVIII. Pop. 29,615, of whom more than one-half are Germans, and nearly a fourth Jews.

Mitcham, a village of Surrey, 8½ miles by rail SW. of Victoria Station, London, and half-way between Wimbledon and Croydon (3 miles from each), lies in the centre of a district in which flowers and aromatic herbs (roses, lavender, camomile, &c.) are extensively grown. Pop. 8960.

Mitchel, JOHN, an Irish patriot, was born the son of a Presbyterian minister at Dungiven in County Derry, 3d November 1815. He studied at Trinity College, Dublin, and practised several years as an attorney at Banbridge. Soon after the formation of the Young Ireland party, and the starting of the *Nation* in 1842, Mitchel began to contribute, and after the death of Thomas Davis in 1845 he became assistant-editor. But his language was too violent for the paper, and three years later he started the *United Irishman*, for his articles in which he was tried on a charge of 'treason-felony' and sentenced to fourteen years' transportation. He was sent to Bermuda, and next to Van Diemen's Land, whence he made his escape to the United States in the summer of 1853. In New York he published his *Jail Journal, or Five Years in British Prisons* (1854). Next followed a series of short-lived newspapers, the *Citizen*, the *Southern Citizen*, the Richmond *Inquirer*, and the *Irish Citizen*, which cost him the confidence of many of his American friends by its enthusiastic defence of slavery and the South. In 1874 he returned unmolested to Ireland, and was elected to parliament for Tipperary, but declared ineligible. Again elected, he died at Cork, 20th March 1875.

Of his books may be mentioned a *Life of Hugh O'Neill, Prince of Ulster* (1845); and *History of Ireland from the Treaty of Limerick* (1868); besides editions of the poems of Thomas Davis (1856) and James C. Mangan (1859). See the Life of him by William Dillon (2 vols. 1888).

Mitchell, capital of Davison county, South Dakota, 70 miles by rail W. of Sioux Falls, has a foundry and machine-shop, flour-mills, packing-house, &c. Pop. 5000.

Mitchell, DONALD GRANT, an American author, many of whose works have appeared under the pen-name of 'Ik Marvel,' was born in Norwich, Connecticut, 12th April 1822, was in 1853 appointed consul at Venice, in 1868–69 editor of the *Atlantic Monthly*, but is better known as the proprietor of a farm—Edgewood—near New Haven, about which he has written several delightful books. Among his other works are *Reveries of a Bachelor* and *Dream Life* (1850–51; new eds. 1889); a novel, *Dr Johns* (1866); and *English Lands, Letters, and Kings, from Celt to Tudor* (1889).

Mitchelstown, a market-town of County Cork, Ireland, 11 miles N. of Fermoy, became for a time a familiar name in the political war-cry 'Remember Mitchelstown.' On 9th September 1887, at a Nationalist meeting, the people refused to allow the government shorthand-writer to approach the speakers. The police endeavoured to make a way for him, but were resisted by the crowd. A riot ensued, on which the police fired, and two men were shot dead. In the immediate vicinity of the town is Mitchelstown Castle, the mansion of the Earls of Kingston, and 7½ miles to the north-east there are extensive stalactite caves, discovered in 1853. Pop. 2467.

Mite. See ACARINA, CHEESE-MITE.

Mitford, MARY RUSSELL, born at Alresford, Hants, 16th December 1786, was the only child of a physician, a selfish, extravagant man, who spent several fortunes, and was always in debt. A few years after his marriage he moved to Lyme Regis, and thence to London. On Mary's tenth birthday he took her to a lottery office, and bought her a ticket. She chose a particular number which drew a prize of £20,000. While this money lasted she was sent to a good school in Chelsea, and Dr Mitford built himself a large house near Reading. Here Mary returned when she was fifteen, a clever, accomplished girl, devoted to her parents, a great reader, and fond of gardening. Her first volume of poems appeared in 1810, and was followed in 1811 and 1812 by two other poems. Meantime, as the family became more and more impoverished, they were obliged to move to a cottage at Three Mile Cross, near Reading, and at length the need came for Miss Mitford to write to earn money. She wrote for magazines, and plays for the stage. Four of her tragedies, *Julian*, *The Foscari*, *Rienzi*, and *Charles I.*, were acted; the three first met with success, but they have not kept the stage. Her true line was describing what she saw around her in a series of sketches of country manners, scenery, and character. These little essays were rejected by several London editors, but at length found a place in the *London Magazine*, and were published in a collected form in 1824 under the name of *Our Village*, the series of five volumes being completed in 1832. Few would think, as they read this 'playful prose,' with what toil and anxiety it was written. Dr Mitford died in 1842, leaving his affairs in such a state that a subscription was started to enable his daughter to pay his debts; which was soon followed by a pension from the crown. In 1851 Miss Mitford moved to a cottage in Swallowfield, a village close by, where she spent the rest of her life. In 1852 she published *Recollections of a Literary Life*, and in 1854 a novel, *Atherton, and other Tales*. She died 10th January 1855, and was buried at Swallowfield. Her sketches are

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charming; she describes homely scenes and people with the skill of an artist, and the humour and kindliness of a clever, true-hearted woman. See Life by L'Estrange (3 vols. 1878), and his *Friendships of Mary Russell Mitford* (1882).

Mitford, WILLIAM, was born in London, 10th February 1744, entered Queen's College, Oxford, but left without a degree. In 1761 he succeeded to the family estate of Exbury near the New Forest, and in 1769 became a captain in the South Hampshire Militia, of which Gibbon was then major. By Gibbon's advice and encouragement he was induced to undertake his *History of Greece* (5 vols. 1784–1818). It is a pugnacious, opinionative, one-sided, and even fanatical production. The author is an intense hater of democracy, and can see in Philip of Macedon nothing but a great statesman, in Demosthenes nothing but a noisy demagogue. Yet his zeal, which so often led him astray, also urged him, for the very purpose of substantiating his views, to search more minutely and critically than his predecessors into certain portions of Greek history, and the result was that Mitford's work held the highest place in the opinion of scholars until the appearance of Thirlwall and Grote. He sat in parliament from 1783 to 1818, and died at Exbury, 8th February 1827.

See the Memoir prefixed to the 7th edition of his *History* (1838), by his brother John Freeman Mitford (1748–1830), who was Lord-chancellor of Ireland from 1802 to 1806, and was raised to the peerage as Lord Redesdale.

Mithras, or MITHRA, a Perso-Iranian divinity, whose worship, after passing through several changes and transformations, spread itself for a time far beyond the limits of its native seat. In the Zendavesta, or sacred writings of the ancient Persians, Mithras appears as chief of the Izeds or good genii, the god of the heavenly light and the lord of all countries. Protector and supporter of man in this life, he watches over his soul in the next, defending it against the spirits of evil. In the dualism of Zoroaster he fights as an invincible hero on the side of the principle of good, Ahura-Mazda or Ormuzd, in his eternal struggle with his rival Angra-Mainyu or Ahriman. At this stage the qualities attributed to Mithras had probably only a moral signification. Afterwards, as the political power of the Persians increased and their religion grew, by the natural processes of development and absorption, more ritualistic and composite, Mithras became the sun-god and was represented by the orb of day, which was worshipped in his name. By degrees his importance increased till he had scarcely a rival in the Persian pantheon. Unfortunately, owing to the almost entire destruction of the early religious literature of the East by the fanaticism of the followers of Mohammed, our knowledge of Mithraism as the dominant religion of its day is indirect and vague. Too great reliance is not to be placed on the speculations in which some modern writers such as Lajard indulge regarding it. But it would seem to have been, in its ultimate form at least, a system of secret rites and mysteries. For admission to these the aspirant was prepared by a series of trials of a severe description. He then underwent initiation, which, when duly and completely performed, comprised seven, or according to others twelve, degrees or successive steps, symbolically marked by the names of certain birds and animals. Baptism and the partaking of a mystical liquid, consisting of flour and water, to be drunk with the utterance of sacred formulas, are also said to have been among the inaugurative acts. Most of the ceremonies through which the devotee had thus to pass were of an extraordinary and even dangerous character. In spite, however, of all this rigour, Mithraism must have had attractions of no ordinary kind. Introduced into Rome in 68 B.C. by some Cilician pirates whom Pompey had captured and whose national religion it was, it rapidly spread through the greater part of the empire. The well-known taurine tablets sculptured in bas-relief are the most interesting of its monuments that have come down to our time. There is a fine example in the British Museum, and others are to be seen in the principal museums of Europe. Mithras now appears as a beautiful youth, dressed in Phrygian garb, kneeling upon a bull, into whose neck he plunges a dagger. Surrounding the group are various emblems, a scorpion, a serpent, a dog, a raven, a crescent, and others, to which an astronomical or an allegorical meaning has been variously assigned. Caves in the living rock were often the scene of this sacrifice of the bull; but it was also performed in small temples or Mithræums, one of the most perfect of which was discovered in Ostia by the Cavaliere Lanciani (see *Athenæum*, Nov. 6, 1886). The floor and walls of this chapel are lined with mosaics representing the twelve signs of the zodiac, and the course of the planets, and containing allusions to the rites of Mithras. Tablets found at Housesteads in the Roman wall and at York are proof of the presence of Mithraism in Britain, to which it had doubtless been brought by the legionaries. Having come into collision with Christianity, it was formally suppressed by the prefect Gracchus 378 A.D., though St Jerome speaks of it as being still practised in his time.

See Montfaucon, *L'Antiquité Expliquée* (Paris, 1719); Hammer-Purgstall, *Mithriaca ou les Mithriaques* (1833); Wellbeloved, *Eburacum* (York, 1842); Lajard, *Recherches sur le Culte Publique et les Mystères de Mithra* (atlas of plates in 1847, letterpress not till 1867); Windischmann, *Mithra* (1857).

Mithridates (more properly MITHRADATES; Persian, 'given by Mithras'), the name of several kings of Pontus, Armenia, and Parthia, all of whom have sunk into insignificance, with the exception of Mithridates VI. of Pontus, surnamed Eupator, but more generally known as Mithridates the Great. He succeeded his father, probably about 120 B.C., while under thirteen years of age, and soon after subdued the tribes who bordered on the Euxine as far as the Chersonesus Taurica (Crimea). The jealous behaviour of the Romans, and the promptings of his own ambitious spirit, now incited him to invade Cappadocia and Bithynia, but a wholesome fear of the power of the great republic induced him to restore his conquests. The *First Mithridatic War* was commenced by the king of Bithynia (88 B.C.), who, at the instigation of the Romans, invaded Pontus. The generals of Mithridates repeatedly defeated the Asiatic levies of the Romans, and he himself took possession of Bithynia, Cappadocia, Phrygia, and the Roman possessions in Asia Minor. He also sent three powerful armies to aid the Greeks. He was, however, driven from Pergamus (85 B.C.) by Flavius Fimbria, and reduced to the necessity of making peace with Sulla, relinquishing all his conquests in Asia, giving up 70 war-galleys to the Romans, and paying 2000 talents. The wanton aggressions of Murena, the Roman legate, gave rise to the *Second Mithridatic War* (83–81 B.C.), in which Mithridates was wholly successful. In 74 B.C. he invaded Bithynia, commencing the *Third Mithridatic War*. He obtained the services of Roman officers of the Marian party, and his arms were at first prosperous; but afterwards the Roman consul Lucullus compelled him to take refuge with Tigranes of Armenia (72 B.C.). Lucullus then conquered Pontus, defeated Tigranes (69 B.C.) at Tigranocerta, and both Tigranes and Mithridates at Artaxata (68 B.C.). Mithridates, however, recovered possession of Pontus. After

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the war had lingered for some time, Pompey completed the work of Lucullus (66 B.C.), defeating Mithridates on the Euphrates, and compelling him to flee to his territories on the Cimmerian Bosporus. Here his indomitable spirit prompted him to form a new scheme of vengeance, which was, however, frustrated by the rebellion of his son, Pharnaces, who besieged him in Panticapæum. Deeming his cause hopeless, Mithridates put an end to his own life (63 B.C.). Mithridates was a specimen of the true eastern despot, possessing great ability and extraordinary energy and perseverance. He had received a Greek education at Sinope, is said to have spoken the twenty-two languages and dialects of his subject-peoples, and made a great collection of pictures, statues, and engraved gems.

Mitrailleuse. See MACHINE GUN.

Mitral Valve. See HEART.

Mitre (Lat. *mitra*, also *infula*), the head-dress worn by bishops in solemn church services. The name, as probably the ornament itself, is borrowed from the orientals, although, in its present form, it is not in use in the Greek Church, or in any other of the churches of the various eastern rites. The western mitre is a tall, tongue-shaped cap, terminating in a twofold point, which is supposed to symbolise the 'cloven tongues,' in the form of which the Holy Ghost was imparted to the apostles, and is furnished with two flaps, which fall behind over the shoulders. Opinion is much divided as to the date at which the mitre first came into use. Eusebius, Gregory of Nazianzus, Epiphanius, and others speak of an ornamented head-dress, worn in the church; but the cleft mitre does not seem to have been known till the 12th century. The material used in the manufacture of the mitre is very various, often consisting of most costly stuffs, studded with gold and precious stones. The mitre of the pope is of quite a different form, and is called by the name *Tiara* (q.v.). Although the mitre properly belongs to bishops only, its use has been permitted by special privilege to certain abbots, to provosts of some distinguished cathedral chapters, and to a few other dignitaries.

Mitre.

In the English Church, since the Reformation, the mitre was no longer a part of the episcopal costume till 1885, when it was resumed by the Bishop of Lincoln; but it is placed over the shield of an archbishop or bishop, instead of a crest. The Bishops of Durham surround their mitre with a ducal coronet, in consequence of their having been till 1836 Counts Palatine of Durham.

Mitscherlich, EILHARD, chemist, was born at Neuende, near Jever in Oldenburg, Germany, on 7th January 1794, and died at Schöneberg near Berlin on 28th August 1863. At the university of Heidelberg (1811–13) he devoted himself to philology, especially to Persian. At this time of his life his ambition was to go to Persia, and for this end he visited Paris and began to study medicine in Göttingen after 1814. But whilst studying medicine, his deepest interest was arrested by the sciences of geology and mineralogy, chemistry and physics. Work in the Berlin laboratory in 1819 led him to discover the law of Isomorphism (q.v.). Berzelius invited the young chemist to Stockholm (1820), from which city he returned (1822) to fill the chair of Chemistry at Berlin. One of his earliest discoveries after his appointment was that of the double crystalline form of sulphur, one of the first observed cases of Dimorphism (q.v.). His investigations regarding the production of artificial minerals, and his memoirs on benzene and the formation of ether, must also be noted. His principal work is *Lehrbuch der Chemie* (2 vols. 1829–35; 4th ed. 1840–48; 5th begun in 1855, but not completed). See Memoir by Rose (Berlin, 1864).

Mittweida, a town of Saxony, 11 miles by rail N. by E. of Chemnitz, has an engineers' and a weavers' school, and manufactures linen, woollen, and cotton goods. Pop. 9461.

Mitylene. See LESBOS.

Mivart, ST GEORGE, F.R.S., born 1827, was educated for the bar, but devoted himself to the biological sciences. In 1862–84 he acted as professor of Zoology and Biology at the Roman Catholic University College in Kensington, and in 1890 was appointed to the chair of Philosophy of Natural History at Louvain. He is known as an able and zealous opponent of the 'Natural Selection' theory. Among his works are *The Genesis of Species* (1871), *Man and Apes* (1873), *Contemporary Evolution* (1874), *Lessons from Nature* (1876), *The Cat* (1881), *Nature and Thought* (1883), and *The Origin of Human Reason* (1889).

Mixed Marriages. See MARRIAGE, p. 58.

Mizen, the sternmost of the masts in a three-masted vessel. See SHIP.

Mnemonics (Gk. *mnēmōn*, 'mindful'), the art of assisting the memory; a mode of recalling to the mind any fact or number, or a series of disconnected terms or figures. Even ordinary recollection, according to Cicero, is not purely spontaneous or natural, but has some element of artificial suggestion, something to prompt the mind. To recall in the future a fact or figure, we associate it now with something else which is more to our hand; and afterwards the mental reproduction or actual presentation of the latter will give a suggestion of the former, in accordance with the psychological 'law of contiguity.' The number 3·1415926536 seems to a schoolboy hard of recollection till he is shown its importance in connection with certain ratios—when measuring a circle, ellipse, sphere, or cone, &c.—and then taught the phrase *But I must a while endeavour to reckon right the ratios.* Each word in that mnemonic sentence supplies, by the number of its letters, a corresponding figure of the ratio to be remembered. What association has the date 871 with King Alfred? None whatever, directly; but if those digits immediately appear as *ami* by a scheme which the pupil has already accepted or invented, then a clue or link-word is furnished to serve for a lifetime: $a = 8$, $m = 7$, $i = 1$. Of the surface of our globe 734 thousandths are water, and by the same mnemotechny 734 becomes *mer*, so that the fact is permanently registered for ready use. The earth's diameter and circumference measure 7926 and 24,900 respectively, which numbers to that mnemotechnist read *mnts* and *trn*, suggesting the phrase 'minutes turn' and the association that time is measured by the earth's rotation. The list *bijou, joujou, chou, genou, caillou, hibou*, in French grammars, gives another familiar instance where recollection would to many be impossible without some artificial association. The following serves that purpose by stringing the words together—'Finding a *jewel* in the garden, he made a *toy* of it, and jumping about he tripped against a *cabbage* and hurt his *knee* on a *flint*, whilst the *owl* overhead hooted derisively.' Some rhythmical mnemotechnic contrivances have been used for ages: one, for example, which, notwithstanding the enormous multiplication of printed calendars, still survives is—'Thirty days hath September,' &c.

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The Latin student is thankful for the mnemonic rhyme

> In March, July, October, May,
> The ides are on the fifteenth day,
> The nones I on the seventh lay;
> The rest thirteenth and fifth alway;

and for centuries no text-book on logic has omitted the five hexameter lines (Barbara, Celarent, &c.) which compress the doctrine of the syllogism into a marvellous minimum of space. In these, however, as well as in the case of those numberless Latin verses over which so much time was till recently spent in our grammar-schools, the only help afforded is from the association of the sounds of certain barbarous dactyls and spondees in the ear. The perfection of mnemotechny is when there is an association by sense or natural suggestiveness. The thought of A will frequently bring Z to the mind sooner than B, because there is something not only not similar but grotesquely dissimilar in the ideas they awaken. Whoever practises the art of memory with success always selects unconsciously such associations as are best suited to the situation from his own point of view; and thus the art cannot be imparted in detail.

The value of mnemotechny under certain aspects is incontestable, considering that many in every class of life are constantly applying some method of storing and then utilising their knowledge. The art is, however, to be distinguished from the general faculty—memory, which is the essential and distinctive faculty of 'mind.' As such it depends not only on attention (as philosophers have ever taught), but on the healthy action of the nervous system and general physique, assisted perhaps in some individuals by a certain plastic and assimilative brain-power. Cicero approved of the art of artificial memory, and probably applied the topical method (to be mentioned presently) in some of his elaborate speeches; but Quintilian implies (*Inst.* xi. 2, 40) that to remember a subject properly we must master it in all its details. Practice and labour, he affirms, constitute the real mnemotechny: the best method of learning much by heart is by long, and if possible, daily study. The aim in such a case, however, was widely different from that which is now generally sought by using artificial memory.

The topical mnemonics (Gr. *topos*, 'place') of the ancients is adapted for recalling in order the arguments and illustrations of a public speech, or the succession of ideas in a poem or narrative. Besides the Roman writers, it is referred to by Plato and Aristotle, and was attributed to Simonides the Greek poet, who died 469 B.C. The speaker having selected, for example, a house with which he is so familiar as to remember well the position, not only of each room and passage, but of all the prominent objects in every room, associates as vividly as possible the introduction of his discourse with the entrance-hall, and systematically assigns thought after thought to the chief points there visible. The first main division of his subject may then be identified, as it were, with the dining-room; and every piece of furniture, every picture, &c., be judiciously utilised for recalling the succession of arguments with their illustrations and results. The second main division may then be associated in like manner with the drawing-room, and everything in it if need be; and thus for the rest of his discourse, till the successive rooms, statues, and windows, &c. are pressed into service, and all the series of his thoughts passed under review. The principle is that to recall a series of ideas they can be associated more easily with familiar (and, as it were, visible) objects or places than with each other. Another form of topical mnemotechny was based on imagining the four walls of each room, and its floor, to be each divided into nine *places*, and a distinct object—such as a particular bust, picture, or tree, &c.—to be inseparably associated with each place. When these objects are thoroughly known so as to be promptly and faultlessly recalled, then the mnemotechnist who has a succession of things to be remembered assigns them to a particular room and compels himself to detect some association, no matter how incongruous, between each of them and one of the 'hieroglyphs' which are to serve as memorial links.

Many minor systems for learning dates and detached numbers have been based on that of Gregor von Feinaigle, a German who lectured in London, 1811. His scheme was

1	2	3	4	5	6	7	8	9	0
t	n	m	r	l	d	k	b	p	s

each letter was more or less suggestive of the figure which it represents: moreover, *p* may be supplanted by *f*, *k* by *c* or *g*, and *b* by *v* or *w*, &c. Thus, as an example, the Anglian kingdom from the Humber to the Firth of Forth was founded in 547, and by Feinaigle's scheme that date becomes *lrk*. By inserting vowels we form the mnemonic words *lark*, *lurk*, *large*, *lyric*, *Alaric*, &c., any one of which the historical student may choose to suit his notions of King Ida the Flamebearer, so as to remember the date of his landing in Yorkshire. Another student, for the same date, might prefer *la race*, *la rage*, &c., or Lat. *lorica* ('cuirass').

The following system (1730), that of Richard Grey, D.D. (1694–1771), does not require, like Feinaigle's, the insertion of arbitrary vowels, and is therefore not so elastic:

1	2	3	4	5	6	7	8	9	0
b	d	t	f	l	s	p	k	n	z
a	e	i	o	u	au	oi	ei	ou	y

A recent mnemotechnist, Dr Pick, has improved Feinaigle's method by introducing a principle not unlike that which we have noted in describing the topical systems. Given a list of detached words—e.g. 'garden, hair, watchman, philosophy,' &c.—they can be recalled in order by inserting between each pair a connective word which links them or forms a bridge. Thus, *garden*, maidenhair fern; *hair*, bonnet; *watchman*, wake, study; *philosophy*, &c. Other mnemotechnists have been Schenkel, 1547; Aimé Paris, 1833; Karl Otto, 1840; Gouraud, 1845; and Loisette. Grey's system was really a modification of that of Winckelmann, which attracted the notice of Leibnitz and gave him the suggestion of a universal alphabet.

Mnemo'synē, in Greek Mythology, the daughter of Uranus, and mother of the nine muses by Zeus. The principal seat of her worship was at Eleutheræ, in Bœotia.

Moa (*Dinornis*, 'monstrous bird'), the name given by the Maoris to a genus of extinct ostrich-like birds that inhabited New Zealand and, to a less extent, Australia. It is supposed that none has been seen alive since about the middle of the 17th century, but the Maoris have many traditions relating to them, and moa-hunting was a recognised sport. Their bones have been found in great numbers imbedded in the sands of the shore, and of lakes, swamps, and river-beds. A few remains of eggs have also been found, and one nearly complete one containing a young bird; the eggs were about 10 inches long and 7 broad. Feathers and a part of the neck with muscles and skin attached have been discovered. There were several species of various size, the smallest about 2 feet, the largest about 14 feet in height. Their chief peculiarity was the entire absence of wings, not even the smallest rudiments having been found; associated with this

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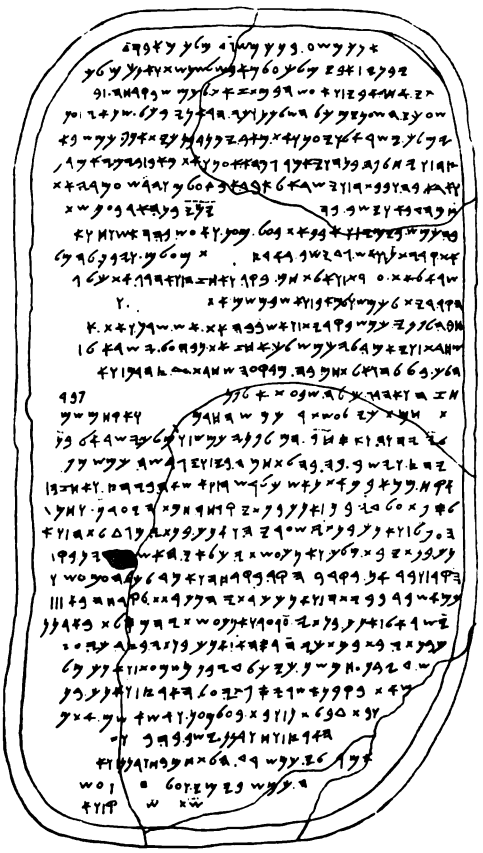
was the great size and weight of the legs, the bones of which and of the toes were in one species almost elephantine. There was an allied genus called Palapteryx which possessed the rudiments of wings and a fourth toe, which was absent in moa. They are most nearly represented at present by the genus Apteryx, whose relative size may be seen in the figure.

Restoration of the Moa.

Moabites, a pastoral people, who inhabited the bleak and mountainous country east of the lower part of the Jordan and of the Dead Sea, divided into two portions by the deep bed of the Arnon. Their capitals were Ar-Moab and Kir-Moab, both south of the Arnon, but their kings often resided in their native places, as Mesha in Dibon. Their sovereign divinity was Chemosh, and patriotism was an essential part of their religion. They were ethnologically cognate with the Hebrews, and were compelled to become tributary to David, but about 850 B.C. shook off their allegiance to the Jewish kings, and afterwards took part with the Chaldeans against the Jews. Their name no longer exists, and the remnants of the people have long been included among the Arabs. The most striking feature about the country in modern times is the immense number of rude stone monuments with which it is covered. Major Conder found no fewer than a thousand of these of the usual varieties (dolmens, menhirs, circles, and alignments) familiar in the British Isles and Brittany, occurring in distinct centres, usually with a cairn at the top of the nearest hill. He rejects the sepulture theory, and believes the dolmens to have been altars. The menhirs were anciently objects of worship, anointed with oil, or smeared with blood, and such a series of alignments and scattered stones as those of El-Mareighât may be supposed to be offerings of pilgrims to this shrine. For the so-called Moabite pottery, which Shapira succeeded in selling to the German government for nearly £3000, see an account by M. Clermont-Ganneau, who detected the imposture, in *Les Fraudes archéologiques en Palestine* (1885); see also Conder's *Heth and Moab: Explorations in 1881–82* (1883).

MOABITE STONE, a stone bearing an inscription of thirty-four lines in Hebrew-Phœnician letters, was discovered by the Rev. F. Klein in 1868 among the ruins of Dhibân, the ancient Dibon. The stone was of black basalt, rounded at the top and bottom, 2 feet broad, 3 feet 10 inches high, and 14½ inches in thickness, but was unfortunately broken up by the Arabs, whose cupidity had been aroused by the indiscreet eagerness to acquire it shown by M. Clermont-Ganneau. The fragments were afterwards collected and laboriously fitted into their proper places by means of imperfect squeezes made before the stone was broken, and the monument now stands in the Louvre at Paris. The inscription was discovered to be a record of Mesha, king of Moab, mentioned in 2 Kings, iii., referring to his successful revolt against the king of Israel. The



The Moabite Stone.
(From Dr Ginsburg's monograph.)

characters of the inscription are Phœnician (see ALPHABET), and form a link between those of the Baal Lebanon inscription (10th century) and those of the Siloam text.

See Dr Ginsburg's *Moabite Stone* (2d ed. 1871); Héron de Villefosse's monograph, *Notice des Monuments provenants de la Palestine* (1876), contains a bibliography of books and papers written on this subject. Readings are given by Clermont-Ganneau in the *Revue Critique* for 1875, by Profs. R. Smend and A. Socin of Tübingen in their monograph, *Die Inschrift des Königs Mesa von Moab für Akademische Vorlesungen* (Freiburg, i. B., 1886), and by Dr A. Neubauer in *Records of the Past* (new series, vol. ii. 1889).

Moawiya. See CALIF, Vol. II. p. 648.

Moberly, capital of Randolph county, Missouri, 148 miles by rail WNW. of St Louis, is an important railway junction, and the depôt of a rich coal country. It has large railway-shops, rope-walks, and foundries. Pop. (1890) 8213.

Mobile, the principal city and only seaport of Alabama, is situated on the west side of Mobile River, and at the head of Mobile Bay, which opens into the Gulf of Mexico, and is defended by Fort Morgan. It is 141 miles by rail ENE. of New Orleans, and is built with broad shaded streets on a sandy plain, rising gradually from the river. It has a fine custom-house and post-office (1859), a city hall and market-house (1857), a Roman Catholic cathedral and over thirty other churches, several asylums and hospitals, a medical college, a Jesuit college, and a convent and school. Mobile contains

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a floating dry-dock and several shipyards, foundries, cotton and cottonseed-oil mills, a tannery, a manufactory of chewing-gum, numerous cigar-factories, &c. Before the war the chief business was the export of cotton; but since then this trade has shrunk almost to one-third of its former proportions, while the export of timber has increased. Mobile was settled by the French in 1702, and was a Spanish town until 1813, and its population still shows traces of this Latin origin. In 1879 the city limits were curtailed somewhat. Pop. (1870) 32,034; (1890) 31,822.

Mobilier, CRÉDIT. On the 18th November 1852 the French government sanctioned the statutes of a new bank under the name of the *Société Générale de Crédit Mobilier*. The name was intended as a contrast to the *Sociétés de Crédit Foncier* (see CRÉDIT FONCIER), which are of the nature of land banks, and advance money on the security of real or *immovable* property; while the Crédit Mobilier proposed to give similar aid to the owners of *movable* property. The declared object of this bank is especially to promote industrial enterprises of all kinds, such as the construction of railways, sinking of mines, &c. Various privileges were conferred upon it under its charter; in especial, it was allowed to acquire shares in public companies, and to pay the calls made upon it in respect of such shares, by its own obligations (or bonds); also to sell or give in security all shares thus acquired. The operations of the society were conducted upon a very extensive scale. In 1854 it subscribed largely to the government loan on account of the Russian war, to the Grand Central Railway Company, to the General Omnibus Company of Paris, and to various other important undertakings. The dividend for this year was 12 per cent. In 1855 it lent two sums to the government—the one of 250 and the other of 375 millions of francs. Its operations were vast during this year, and the dividends declared amounted to 40 per cent. The directors had not hitherto availed themselves of their privilege of issuing their own obligations, but this they now resolved on doing. They proposed to issue two kinds—the one at short dates, the other at long dates, and redeemable by instalments. The proposed issue was to amount to 240 millions of francs, but the public became alarmed at the prospect of so vast an issue of bonds, so that, in March 1856, the French government deemed it necessary to prohibit the carrying out of the proposed scheme. This was a severe blow to the institution. In 1856 its dividends did not exceed 22 per cent.; in 1857 they were only 5 per cent. Several attempts had been made to resuscitate its credit, but failed. On 12th November 1871 it was reorganised, the assets of the first society being reported at 48 million francs. In 1878 the capital was reduced from 80 millions to 32, and in 1879 raised again to 40 millions. Another reduction of capital was made in 1884—30 million francs.—On the model of the Crédit Mobilier, companies were organised in England, Holland, America, and elsewhere. The Crédit Mobilier, Limited, was established in London on 29th March 1864. It amalgamated on 30th September of the same year with the Crédit Foncier as the Crédit Foncier and Mobilier of England, Limited; and on the reorganisation of that company in 1866 the words 'and Mobilier' were dropped. The Crédit Mobilier has undoubtedly been useful, but its operations have been hazardous, public advantages being gained at the expense of private losses.

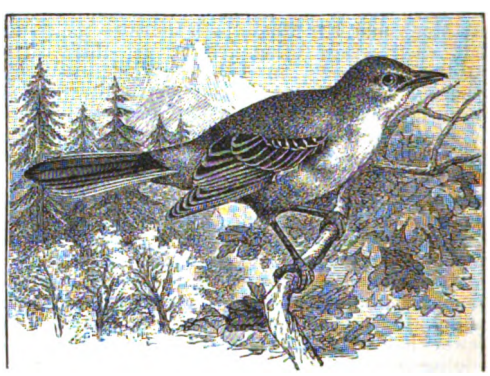
Mobilisation, a word for the act of making an army ready for taking the field. The process consists in bringing the various units to war strength by calling in reserve men, in organising the staff of brigades, divisions, and army corps, constituting the commissariat, medical, and transport services, and in accumulating provisions and munitions. As the work of mobilising an army causes great and inevitable expense, it is only resorted to when hostilities appear imminent.

Moccasin, the shoe of the North American Indian, made all of soft hide, and often ornamented.—The Moccasin Snake (*Toxicophis piscivorus*) of North America is a brown-coloured poisonous swamp snake; the skin is marked with black bars.

Mocha, a seaport, and once the capital of Yemen in Arabia, is situated on the Red Sea, 130 miles WNW. of Aden. From early in the 16th century until the middle of the 17th Mocha was the port from which the coffee of Yemen was principally exported; hence called Mocha coffee. It is now a decayed place. Pop. 5000.

Mocha Stones are pieces of agate or of chalcedony, containing dendritic infiltrations, often assuming appearances very like finely ramified confervæ, &c. They were first brought to Europe from Mocha. Of the same nature with Mocha stones are *Moss Agates*.

Mocking-bird, or MOCKING-THRUSH (*Mimus*), a genus of birds of the family Turdidæ, order Passeres, having a more elongated form than the true thrushes, a longer tail, shorter wings, and the



Mocking-bird (*Mimus polyglottus*).

upper mandible more curved at the tip. Twenty species are known, ranging from Canada to Patagonia, and from the West Indies to the Galapagos Islands. The best-known species, the mocking-bird of the United States (*M. polyglottus*), is about the size of the song-thrush; the upper parts of a dark brownish ash colour, the wings and tail nearly black, the under parts brownish white. The mocking-bird is common in almost all parts of America, from the south of New England to Brazil; north of the Delaware it is only a summer visitant, but in more southern regions it is found at all seasons. It is one of the most common birds of the West Indies, and its exquisite song fills the groves with melody by night, for which reason it is there very generally known as the nightingale. By day the mocking-bird is generally imitative, excelling all birds in its power of imitation, now taking up the song of one bird, and now of another, and often deceiving the most practised ear by its perfect performance. By night its song is for the most part natural. It does not confine itself, however, to musical strains; it seems to take equal pleasure in repeating the harshest cries of the feathered tribes, and in domestication readily adds to its accomplishments the imitation of almost any sound which it is accustomed to hear, passing from one to another with great rapidity, so as to

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produce an incomparable medley. The mocking-bird readily learns to whistle a tune, even of considerable length, but there is no well-authenticated instance of its imitating the human voice. The barking of a dog, the mewing of a cat, the crowing of a cock, the cackling of a hen, the creaking of a wheel-barrow are all within the compass of its powers. During its performances it spreads its wings, expands its tail, and throws itself about, as if full of enthusiasm and enjoyment. The mocking-bird is vocal at all seasons of the year. It enjoys almost everywhere the protection of man, and often makes its nest in a tree or bush close beside a house. The nest is rudely constructed of dried sticks, withered leaves and grasses, and lined internally with fibrous roots. The eggs are of a short ovoid form, and of a light-green colour spotted with amber. For the first brood from four to six are laid; for the second, four or five; and when there is a third brood, seldom more than three. The first brood is hatched about the middle of April. The male is extremely attentive to his mate, and manifests extraordinary courage in driving away enemies from the nest. Mocking-birds often assemble on such occasions, and birds of prey, far superior to them in size and strength, are compelled to retreat. Snakes are killed by reiterated blows on the head, and cats learn to consider the vicinity of a mocking-bird's nest unsafe. The food of the mocking-bird consists chiefly of berries and insects. The mocking-bird is easily reared by the hand if removed early from the nest, but it is said that it never attains in captivity the same wealth of song as in its free state. Another species of mocking-bird is found in the Rocky Mountains, and species of the same genus are among the finest song-birds of the temperate parts of South America.

Mock Orange, a name applied in England to the Syringa (q.v.), and in the United States to the *Prunus caroliniana*, a small evergreen resembling the cherry-laurel.

Mode, a name given to the ecclesiastical scales formulated by St Ambrose and St Gregory (see HARMONY, PLAIN-SONG). For Major and Minor Modes, see SCALE.

Modelling. See CLAY, POTTERY, SCULPTURE.

Mod'ena (anc. *Mutina*), capital of the former duchy of Modena, stands on a broad plain in Northern Italy, 23 miles by rail NW. of Bologna. Pop. (1881) 31,053; in commune, 58,058. It is surrounded with ramparts, now converted into promenades, and has fine streets, many of them arcaded both sides. The ancient Via Æmilia divides it into the old and new city. The cathedral of St Geminianus, a Romanesque building, was begun, at the instance of the famous Countess Matilda, in 1099, and has a fine façade; its campanile is one of the great towers of Italy. The ducal (now royal) palace, a picturesque structure of the 17th century, has an infinity of galleries, courts, and marble arches, and contains the Este library of 90,000 volumes and 3000 MSS., the Este archives, collections of coins, and the gallery of pictures, including works by Guido, the Carracci, Guercino, Correggio, and other great Italian masters. Modena possesses besides a university (1678), with 35 teachers and 287 students, an academy of sciences and arts, an observatory, a botanic garden, and military schools. The chief manufactured products are silk, leather, vinegar, and cast metals. There is a very lively trade in agricultural products. Originally an Etruscan town, Modena was conquered successively by the Gauls and the Romans, and destroyed by Constantine the Great, the Goths, and the Longobards. Charlemagne made it the capital of a line of counts. The family of Este (q.v.) became its masters in 1288; and in 1452 the reigning marquis was created duke by the Emperor Frederick III. During the first half of the 19th century its dukes pursued a tyrannous reactive policy against liberalism, and were on more than one occasion expelled their dominions, finally and definitively in 1860. The duchy was then incorporated in the kingdom of Italy, and afterwards divided into the provinces of Modena, Reggio, and Massa-Carrara. Area of province, 994 sq. m.; pop. (1881) 279,254; (1889) 303,541.

Modica, an inland town of Sicily, 45 miles SW. of Syracuse, with trade in fruit, oil, wine, and grain. Pop. 38,390.

Modjeska, HELENA, Polish actress, was born in Cracow, 12th October 1844, and began to act in a travelling company in 1861. Four years later she made a great name at Cracow, and from 1868 to 1876 was the first actress of Warsaw. Then she settled, with her second husband, near Los Angeles, California, to try farming; but the enterprise not succeeding, she returned to the stage, and won a complete triumph as Adrienne Lecouvreur at San Francisco in 1877, although she acted in English, of which language she had known nothing seven months before. Since that time she has been acknowledged one of the best of modern emotional actresses, achieving her greatest triumphs, both in the United States and in Great Britain, in such rôles as Juliet, Rosalind, Beatrice, and in the *Dame aux Camélias* and Sardou's *Odette*.

Modocs, an Indian tribe of Northern California, which in 1872, after firing on the United States forces, retreated to the neighbouring lava-beds, and there defended themselves desperately till June 1873, killing or wounding 132 of the troops. Their chief, Captain Jack, and three others were hanged in October; about a hundred who had not followed him were permitted to remain in California, the rest (145) were transferred to Indian territory.

Modulation, in Music. When in the course of a melody the keynote is changed, and the original scale altered by the introduction of a new sharp or flat, such change is called modulation. Much of the pleasure of music is derived from a judicious use of modulation. The art of good modulation from one key to another consists in the proper choice of intermediate chords. Sudden transitions, without intermediate chords, should be employed but sparingly, and in peculiar circumstances.

Moe, JÖRGEN (1815–82). See ASBJÖRNSEN.

Möen, a Danish island in the Baltic Sea, at the south-east end of Zealand. It is 20 miles in length, and has 13,000 inhabitants.

Mœris, LAKE, the ancient Greek name of a sheet of water in Egypt, now in the province of Fayyûm (q.v.), about 50 miles SW. of Cairo; extreme length from north-east to south-west, 35 miles. The waters are brackish. In the time of the Pharaohs the revenue derived from the fisheries was applied to the maintenance of the queen's wardrobe and perfumes.

Moero, or MERU, LAKE, lies SW. of Tanganyika in Central Africa, on 9° S. lat. and 29° E. long., and is traversed by the Luapula (see CONGO). This lake was discovered by Livingstone in 1868. Its shores yield salt.

Mœsia, an ancient Roman province, divided by the river Cibrus (Zibritza) into two parts, the eastern corresponding to the present Bulgaria, and the western (Mœsia Superior) to Servia. Its original inhabitants were mostly of Thracian race. In 75 B.C. the Romans first came into

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conflict with the Gaulish or Celtic invaders of the land, who had settled in Western Mœsia two hundred years previously; but they did not conquer Western or Upper Mœsia until 29 B.C. and Eastern or Lower Mœsia until 15 B.C. To protect these provinces from the Dacians and Sarmatians beyond the river, a wall was built and fortified posts erected along the Danube. The Emperor Valens permitted the Visigoths to settle in Mœsia in 375 A.D. From the 5th to the 7th century Western Mœsia was colonised by the Slav races who still occupy it, and Eastern Mœsia by the Bulgarians.

Mœso-Goths, the name given to the Goths (q.v.) who in the 3d century and in the 5th settled in Lower Mœsia. It was for them that Ulfilas (q.v.) translated the Scriptures.

Moffat, a pleasant watering-place and burgh of barony (1635) in Upper Annandale, Dumfriesshire, 51 miles SSW. of Edinburgh by road, and 64 by a short branch (1883) of the Caledonian Railway. It lies 370 feet above sea-level, engirt by round grassy hills (the loftiest, Hartfell, 2651 feet), and in the midst of delightful scenery, chief features of which are 'dark Loch Skene,' the Grey Mare's Tail, and the Devil's Beef-tub. Its mineral springs, the principal of which, like that of Harrogate, is saline and sulphurous, have been celebrated since 1653; and its visitors have included Home, Hume, Carlyle, 'Ossian Macpherson,' Boswell, Blair, Burns, and William Black. Pop. (1841) 1413; (1881) 2161. See Turnbull's *History of Moffat* (1871).

Moffat, ROBERT, missionary, was born at Ormiston, East Lothian, 21st December 1795. While following the occupation of a gardener at High Leigh, Cheshire, in 1815, he offered himself for the mission-field. His services were accepted by the London Missionary Society, and he sailed for South Africa in 1816. He arrived at Capetown in January 1817, and proceeded northwards beyond the boundaries of Cape Colony and began his labours (January 1818) in Great Namaqualand at the kraal of Afrikaner, a chief who from being a terror to the neighbouring districts of the colony had embraced Christianity, and now showed a desire for its promotion. On December 27, 1819, Moffat married Mary Smith (1795–1870), daughter of his former employer at Dukinfield near Manchester, who proved a worthy helpmate. He made several journeys and laboured at various stations before he settled at Kuruman (1826–70) in Bechuanaland, north of the Orange River. There he wrought a marvellous work in reforming the habits of the natives, and Kuruman became a centre of Christian light and civilisation. Wherever he went he preached the gospel, and guided the people in the arts of civilised life. He learned the Sechwana language, and printed in it the New Testament (1840), the Old Testament (1857), and several religious works. Moffat spent about five years in England (1838–43), where he had an enthusiastic reception, and published his *Labours and Scenes in South Africa* (1842), which gave a graphic description of his missionary tours and remarkable adventures. In 1843 Moffat returned to his labours reinforced by other missionaries, remaining till 1870, when he finally returned to England after fifty-four years spent in Africa. In 1873 he was presented with £5000 in recognition of his great services. He lectured on African missions in Westminster Abbey in 1875, and in 1881 was entertained at a banquet by the Lord Mayor of London. He died at the village of Leigh, Kent, 9th August 1883. It may be said that Moffat's influence drew Livingstone to Africa; it was to Kuruman Livingstone went first, and he married Mary Moffat. See *Lives of Robert and Mary Moffat*, by J. S. Moffat (1885).

Mofussil (from an Arabic word meaning 'separate'), a term commonly used by Anglo-Indians for the rural part of a district as opposed to the administrative headquarters. Thus in Bengal the Mofussil means practically the whole province beyond the city of Calcutta.

Mogador, or SUEÏRA, a seaport 130 miles WSW. of the city of Morocco. Pop. about 19,000, of whom 8000 are Jews and 200 Europeans. It stands on a rocky promontory opposite a small island, the channel between which forms the somewhat indifferent harbour. It is the best built and most modern town in the empire, having been laid out in 1760 by Cornut, a French engineer. On its landward side the place is surrounded by drifting sandhills, but the climate is salubrious, dry, and temperate. In the Kasbah or Castle, extended in 1865 by the 'New Kasbah,' live the governor and other Moorish officials, nearly all the Christians, the consular corps, and a number of protected Jews: here also are the government offices. The Medînah is exclusively a Moorish quarter, while the Mellah is allotted to the sorely oppressed Hebrews. Mogador is the seat of a considerable trade with the interior, and next to Tangier is of all the Moroccan ports the one frequented by most shipping. Caravans reach it from Timbuktu, and it is the outlet not only for the cities of Morocco and Demnat, but for the whole of the Sûs country. It exports almonds, olive-oil, wool, goat-skins, hair, gum-arabic, beans, lemons (citrons), &c. Commerce is mainly in the Jews' hands. The chief imports are woollens, cottons, glass, candles, tin and copper sheets, and hardware generally. Its manufactures are brass trays, daggers, furniture of ârar wood, woollen cloth, &c. The total imports are on an average worth about £197,000, and the exports £175,000 per annum, of which fully three-fourths are sent from or taken to Great Britain. See Brown's edition of *Pellow's Adventures* (1890).

Mogileff. See MOHILEFF.

Moguer, a town and small port of Spain, on the Rio Tinto, near its mouth, and 8 miles E. of Huelva, with some trade. Pop. 8322.

Mogul, also spelt *Moghul* and *Mughal*, is really but another form of *Mongol*. The term 'great Mogul' is the popular designation of the emperor of Delhi in India. The first Great Mogul was Baber (q.v.), a descendant of Timur the Tartar or Tamerlane (q.v.); he founded the empire in 1526. The dynasty lost its power and territories to the English in 1765. The last emperor, having joined the rebels in 1857, died a prisoner in Rangoon (1862). See Keene, *Moghul Empire* (1866).

Mohacs, a market-town of Hungary, on the western arm of the Danube, 37 miles by rail ESE. of Fünfkirchen. It is a station for steamboats on the Danube, and the seat of considerable trade in wine, coal, timber, and agricultural produce. Pop. 12,385. Here, on 29th August 1526, Louis II. of Hungary, with 25,000 Hungarians, met the Sultan Soliman at the head of 200,000 Turks. The battle resulted in the disastrous defeat of the Hungarians, who lost their king, seven bishops, many nobles and dignitaries, and upwards of 22,000 men. In a second battle fought here on August 12, 1687, the Turks in their turn were defeated by an Austro-Hungarian army under Charles of Lorraine.

Mohair, the wool of the Angora Goat (q.v.). Few animals have so beautiful a covering as the fine, soft, silky, long, and always pure white wool of this goat. See WOOL.

Mohammed (*Muhammad*, and less correctly *Mahomet*; Arab., 'Praised'), the founder of Islam. He was born about the year 570 A.D., at Mecca,

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and was the son of Abdallâh, of the family of the Hâshim, and of Amina, of the family of Zuhra, both of the powerful tribe of the Koreish, but of a side-branch only, and therefore of little or no influence. His father, a poor merchant, died either before or shortly after Mohammed's birth, whom his mother is then supposed to have handed over to a Bedouin woman, to be brought up in the healthy air of the desert; but in consequence of the repeated fits of the child, which were ascribed to demons, the nurse sent him back in his third year. When six years old he lost his mother also. His grandfather, Abd-Al-Muttalib, adopted the boy; and when, two years later, he too died, Mohammed's uncle, Abu Tâlib, though poor himself, took him into his house, and remained his best friend and protector throughout his whole life. It seems that he at first gained a scanty livelihood by tending the flocks of the Meccans. In his twenty-fifth year he entered the service of a rich widow, named Khadîja, likewise descended from the Koreish, and accompanied her caravans—in an inferior capacity, perhaps as a camel-driver—thus visiting Syria. Up to that time his circumstances were very poor. Suddenly his fortune changed. The wealthy, but fifteen years older, and twice widowed Khadîja offered him her hand, which he accepted. She bore him a son, Al-Kâsim—whence Mohammed adopted the name Abul-Kâsim—and four daughters: Zainab, Rukaija, Umm Kulthûm, and Fâtima; and afterwards a second son, whom he called Abd Manâf, after an idol worshipped among his tribe. Both his sons died early. Mohammed continued his merchant's trade at Mecca, but spent most of his time in solitary contemplations.

Mohammed was of middle height, rather lean, but broad-shouldered, altogether of strong build, and fair-skinned for an Arab; slightly curled black hair flowed round his strongly developed head; his eyes, overhung with thick eyelashes, were large and coal-black; his nose, large and slightly bent, was well formed. A long beard added to the dignity of his appearance. A black mole between his shoulders became afterwards among the faithful 'the seal of prophecy.' In his walk he moved his whole body violently, 'as if descending a mountain.'

About the year 600 A.D. Christianity had penetrated into the heart of Arabia, through Syria on the one hand, and Abyssinia on the other. Judaism no less played a prominent part in the peninsula, chiefly in its northern parts, which were dotted over with Jewish colonies, founded by emigrants after the destruction of Jerusalem; and round about Yathrib (Medina) remnants of the numerous ancient sects, dating from the first Christian centuries, such as Sabians and Mandæans, heightened the religious ferment which, shortly before the time of Mohammed, had begun to move the minds of the thoughtful. At that time there arose several men in the Hedjaz who preached the futility of the ancient pagan creed, with its star-worship, its pilgrimages and festive ceremonies, its temples and its fetiches. It had in reality long ceased to be a living faith; but the great mass of the people clung to it as to a sacred inheritance. The unity of God—the 'ancient religion of Abraham'—human responsibility, and judgment to come were the doctrines promulgated by these Hanîfs ('converts'), forerunners of Mohammed; and many, roused by their words, turned either to Judaism or to Christianity. The principal scenes of these missionary labours were Medina, Taïf, and Mecca; this last was then the centre of pilgrimage to most of the Arabian tribes, and there, from times immemorial, the Káaba, Mount Arafat, the Valley of Mina, &c. were held sacred—the Koreish, Mohammed's tribe, having had the care of these sanctuaries ever since the 5th century. It was under these circumstances that Mohammed felt moved to teach a new faith, which should dispense with idolatry on the one hand, as with narrow Judaism and corrupt Christianity on the other. He was forty years of age when he received the first 'divine' communication in the solitude of the mountain Hirâ, near Mecca. Gabriel appeared to him, and in the name of God commanded him to preach the true religion. That he was no vulgar impostor is now generally recognised. What part his epilepsy, or rather hysteria, had in his visions we are not able to determine. Certain it is that, after long and painful solitary broodings, something at times moved him with such fearfully rapturous vehemence that, during his revelations, he is said to have roared like a camel, and to have streamed with perspiration; his eyes turned red, and the foam stood on his lips. The voices he heard were sometimes those of a bell, sometimes of a man, sometimes they came in his dreams, or they were laid in his heart. Waraka, one of his wife's relatives, who had embraced Judaism, spoke to him of the Jewish doctrine, and told him the story of the patriarchs and Israel, not so much according to the Bible as to the Midrash; and the gorgeous hues of the legendary poetry of the latter seem to have made as deep an impression on Mohammed's poetical mind as the doctrine of the unity of God and the *morale* of the Old Testament, together with its civil and religious laws. Christianity exercised a minor influence upon him. All his knowledge of the New Testament was confined to a few apocryphal books, and with all his deep reverence for Jesus, whom he calls the greatest prophet next to himself, his notions of the Christian religion and its founder were excessively vague (see KORÂN).

His first revelation he communicated to no one, it would appear, except to Khadîja, to his daughters, his stepson Ali, his favourite slave Zaid, and his friend the prudent and honest Abu Bekr. His other relatives rejected his teachings with scorn. Abu Láhab, his uncle, called him a fool; and Abu Tâlib, his adoptive father, although he never ceased, for the honour of his family, to protect him, yet never professed any belief in Mohammed's words. In the fourth year of his mission, however, he had made forty proselytes, chiefly slaves and people from the lower ranks; and now first some verses were revealed to him, commanding him to come forward publicly as a preacher, and to defy the scorn of the unbelievers. He now inveighed against the primeval superstition of the Meccans, and exhorted them to a pious and moral life, and to the belief in an all-mighty, all-wise, everlasting, indivisible, all-just, but merciful God, who had chosen him as he had chosen the prophets of the Bible before him, so to teach mankind that they should escape the punishments of hell, and inherit everlasting life. God's mercy was principally to be obtained by prayer, fasting, and almsgiving. The belief in the sacredness of the Káaba and the ceremonies of the pilgrimage was too firmly rooted in his and the people's minds not to be received into the new creed; but certain barbarous habits of the Bedouins, such as the killing of their new-born daughters, were unsparingly condemned by Mohammed. The prohibition of certain kinds of food also belongs to this first period, when he as yet entirely stood under the influence of Judaism; the prohibition of gambling, usury, and wine coming after the Hegira. Whether he did or did not understand the art of writing and reading at the commencement of his career is not quite clear; certain it is that he pretended not to know it, and employed the services of amanuenses for his Koranic dicta,

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which at first consisted merely of brief, rhymed sentences in the manner of the ancient Arabic soothsayers. The Meccans did not object to his doings; they considered him a common 'poet' or 'soothsayer,' who, moreover, was not in his right senses, or was simply a liar. Gradually, however, as the number of his converts increased, they began to pay more and more attention to his proceedings; and finally, fearing mostly for the sacredness of Mecca, which the new doctrine might abolish, they rose in fierce opposition against the new prophet and his adherents, who dared 'to call their ancient gods idols, and their ancestors fools.' The Koreish now demanded that Abu Tâlib should silence or surrender his nephew. Abu Tâlib refused. Many of the converted slaves and freedmen had to undergo terrible punishments; and others suffered so much at the hands of their own relatives that they were fain to revoke their creed. A hundred believers, on the prophet's own advice, emigrated to Abyssinia. Mohammed himself, although protected by the strong arm of Abu Tâlib, was yet at that time so low-spirited and fearful that, before an assembly of the Koreish, he raised three of the idols to mediatorial beings between God and man —a dictum, however, which he next day revoked as an inspiration of Satan, thereby increasing the hatred of his adversaries. All the Hâshimi family were now excommunicated, and all except Abu Lâhab retired to Abu Tâlib's ravine in the mountains east of Mecca. After two years they were restored when on the brink of starvation.

A great grief befell Mohammed at this time—his faithful wife Khadîja died, and, shortly afterwards, his uncle Abu Tâlib; and, to add to his misery, the vicissitudes of his career had reduced him by this time to poverty. An emigration to Taïf proved a failure; it was with great difficulty that he escaped with his life. Shortly after his return from Taïf he married Sauda, and he afterwards so increased the number of his wives that at his death he still left nine, of whom Ayeshah, the daughter of Abu Bekr, and Hafsa, the daughter of Omar, are best known. In the midst of his vain endeavours to find a hearing in his own city, he succeeded, during a pilgrimage, in converting several men from Medina, whose inhabitants had long been accustomed to hear from the numerous Jews there the words Revelation, Prophecy, God's Word, Messiah. The seed sown in the minds of these men bore a fruitful harvest. While he waited for the next pilgrimage he had in vision his night journey to heaven, the relation of which caused even his staunchest adherents to smile at his hallucination. The next pilgrimage brought twelve, and the third more than seventy adherents to the new faith from Medina, and with these he entered into a close alliance. Mohammed now conceived the plan to seek refuge in the friendly city of Medina, and about June 622 A.D. he fled thither. About one hundred families of his faithful flock had preceded him some time before, accompanied by Abu Bekr, and reached, not without danger, the town, called thence Medinat Annabi ('City of the Prophet'), or Medina ('City'), by way of eminence; and from this flight dates the Mohammedan Era, the Hegira (q.v.).

Now everything was changed to the advantage of the prophet and his religion; and if formerly the incidents of his life are shrouded in comparative obscurity, they are from this date known often to their most insignificant details. Formerly a despised 'madman or impostor,' he now assumed at once the position of highest judge, lawgiver, and ruler of the city and two most powerful Arabic tribes. His first care was directed towards the consolidation of the new worship, and the inner arrangements in the congregation of his flock; his next chief endeavour was to proselytise the numerous Jews who inhabited the city, to whom he made many important concessions also in the outer observances of Islam, but he was sorely disappointed in his hopes to convert them. They ridiculed his pretension to be the Messiah, and so enraged him by their constant taunts that he soon abrogated his concessions and became their bitterest adversary up to the hour of his death. The most important act in the first year of the Hegira was his permission to go to war with the enemies of Islam in the name of God—a kind of manifesto chiefly directed against the Meccans. Not being able at first to fight his enemies in open field, he endeavoured to weaken their power by attacking the caravans of the Koreish on their way to Syria. Being successful enough to disturb their trade and to conclude alliances with the adjoining Bedouin tribes, he at last dared to break even the peace of the sacred month of Radjab, and with this the signal to open warfare was given. A battle, the first, between 314 Moslems and about 600 Meccans was fought at Badr, in the second year of the Hegira, December 623; the former gained the victory and made many prisoners. A great number of adventurers now flocked to Mohammed, and he successfully continued his expeditions against the Koreish and the Jewish tribes, chiefly the Beni Keinukâ, of a suburb near Medina, whom he sent destitute into exile; and the Beni Kureidhah of another suburb, 700 of whom he beheaded after the victory, while the women and children were sold. In January 625 the Meccans defeated him at Ohod, where he was dangerously wounded. The siege of Medina by the Meccans in 627 was frustrated by Mohammed's ditch and earthworks. In 6 A.H. he proclaimed a public pilgrimage to Mecca. Although the Meccans did not allow this to be carried out, he gained the still greater advantage that they concluded a term of peace with him at Hudaibiyeh for ten years. He was now allowed to send his missionaries all over Arabia, and even beyond the frontiers, without any hindrance; and in the following year he had the satisfaction of celebrating the pilgrimage with 2000 followers for three days undisturbed at Mecca. Shortly afterwards, during his expeditions against the Jews of Chaibar and Fadak, Mohammed very nearly lost his life: a Jewess, Zainab by name, a relative of whom had fallen in the fight against him, placed a poisoned piece of roast meat before him, and although he merely tasted it he yet up to his death suffered from the effects of the poison. His missionaries at this time began to carry his doctrines abroad. He wrote letters demanding the conversion of Chosroes II., of Heraclius, of the king of Abyssinia, the Viceroy of Egypt, and the chiefs of several Arabic provinces. Some received the new gospel, but Chosroes II., the king of Persia, and Amru the Ghassanide rejected his proposals with scorn, and the latter had the messenger executed in Moab. This was the cause of the first war between the Christians and the Moslems, in which the latter were beaten with great loss by Amru. Some Meccans having taken part in a war between a tribe in their alliance and another in Mohammed's alliance, he marched at the head of 10,000 men against Mecca before its inhabitants had had time to prepare for the siege. It surrendered, and Mohammed was publicly recognised as chief and prophet. With this the victory of the new religion was secured in Arabia. While employed in destroying all traces of idolatry in the captured city Mohammed heard of new armies which several warlike Arabic tribes had concentrated near Taïf (630). There again he was victorious, and now his dominion and creed extended farther and farther every day. From all parts flocked the deputations to do homage to him in the name of the various tribes, either as

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the messenger of God or at least as the Prince of Arabia, and the year 8 of the Hegira was therefore called the year of the Deputations. Once more he made most extensive preparations for a war against the Syrian subjects of Byzantium; but, not being able to bring together a sufficient army, he had to be satisfied with the homage of a few minor princes on his way to the frontiers. Towards the end of the tenth year of the Hegira he undertook his last solemn pilgrimage to Mecca, and there on Mount Arafat fixed for all time the ceremonies of the pilgrimage (Hajj); and he again solemnly exhorted his believers to righteousness and piety, and chiefly recommended them to protect the weak, the poor, and the women, and to abstain from usury.

Returned from Mecca, he occupied himself again with the carrying out of his expedition against Syria, a necessary aid to religion and patriotism in keeping his people together, but fell dangerously ill very soon after his return. One night while suffering from an attack of fever he went to the cemetery of Medina and prayed and wept upon the tombs, praising the dead, and wishing that he himself might soon be delivered from the storms of this world. For a few more days he went about; at last, too weak further to visit his wives, he chose the house of Ayeshah, situated near the mosque, as his abode during his sickness. He continued to take part in the public prayers as long as he could, until at last, feeling that his hour had come, he once more preached to the people recommending Abu Bekr and Osâma the son of Zaid as the generals whom he had chosen for the army. He then asked whether he had wronged any one, and read passages from the Koran preparing the minds of his hearers for his death and exhorting them to peace among themselves. A few days afterwards he asked for writing materials, probably in order to fix his successor as chief of the faithful; but Omar, the most influential of his followers and friends, fearing he might chose Ali while he himself inclined to Abu Bekr, would not allow him to be furnished with them. In his last wanderings he spoke only of angels and heaven. He died in the lap of Ayeshah about noon of Monday the 12th (11th) of the third month in the year 11 of the Hegira (8th June 632). His death caused an immense excitement and distress among the faithful; and Omar, who himself would not believe in it, tried to persuade the people that he was still alive. But Abu Bekr said to the assembled multitude: 'Whoever among you has served Mohammed let him know that Mohammed is dead; but he who has served the God of Mohammed let him continue in His service, for He is still alive and never dies.' While his corpse was yet unburied the quarrels about his successor, whom he had not definitely been able to appoint, commenced; but finally Abu Bekr received the homage of the principal Moslems at Medina. Mohammed was then buried in the night between the 9th and 10th of June, after long discussions, in the house of Ayeshah, where he had died, and which afterwards became part of the adjoining mosque.

A man of Mohammed's extraordinary powers and gifts is not to be judged by a modern commonplace standard; the manners and morals of his own time and country must also be taken into consideration. He was at times deceitful, cunning, revengeful, cowardly, addicted to sensuality, and even a murderer. Yet not only his public station as prophet, preacher, and prince, but also his private character, his amiability, his faithfulness towards friends, his tenderness towards his family, and the frequent readiness to forgive an enemy must be taken into consideration, besides the extreme simplicity of his domestic life; he lived when already in full power in a miserable hut, mended his own clothes, and freed all his slaves. And, to do him full justice, his melancholic temperament, his nervousness, which often bordered on frenzy and brought him to the brink of suicide, and his poetic temperament must not be forgotten. Altogether his mind contained the strangest mixture of right and wrong, of truth and error. Although his self-chosen mission was the abolition of superstition, he yet believed in jinns, omens, charms, and dreams—an additional reason against the now generally abandoned notion that he was a vulgar designer, who by no means deceived himself about those revelations he pretended to have received. And though the religion of Islam may rightly or wrongly be considered the bane of eastern states and nations in our day, it should be remembered that it is not necessarily Islam that has caused the corruption, as indeed its ethics are for the most part of a high order; and in the second place, that Mohammed is not to be made responsible for all the errors of his successors. Take him all in all, the history of humanity has seen few more earnest, noble, and sincere 'prophets,' men irresistibly impelled by an inner power to admonish and to teach, and to utter austere and sublime truths the full purport of which is often unknown to themselves.

See the Lives in German by Weil (1843), Sprenger (1861–65), Nöldeke (1863), Krehl (vol. i. 1884); in French by Delaporte (1874); and Sir W. Muir, *Life of Mahomet* (4 vols. 1858–61; new ed. 1877), and *Mahomet and Islam* (1887); also Syed Ameer Ali, C.I.E., *The Life and Teachings of Mohammed* (1890).

MOHAMMEDANISM, the religion founded by Mohammed, or, according to him, the only orthodox creed existing from the beginning of the world, and preached by all the prophets ever since Adam. It is also called *Islâm*, 'Resignation,' entire Submission to the will and precepts of God. In its exclusively dogmatical or theoretical part it is *Imân*, 'Faith;' in its practical, *Dîn*, 'Religion.' The fundamental principles of the former are contained in the two articles of belief: 'There is no God but God; and Mohammed is God's Apostle.' The Mohammedan doctrine of God's nature and attributes coincides with the Christian, in so far as He is by both declared to be the Creator of all things in heaven and earth, who rules and preserves all things, without beginning, omnipotent, omniscient, omnipresent, and full of mercy. But, according to the Mohammedan belief, He has no offspring: 'He begetteth not, nor is He begotten.' Nor is Jesus called anything but a prophet and apostle, although His birth is said to have been due to a miraculous divine operation; and as the Koran superseded the Gospel, so Mohammed superseded Christ. The crucifixion is said to have been carried out upon another person, Christ having been taken up unto God before the decree was put into execution. Christ will come again upon the earth to establish everywhere the Moslem religion, and to be a sign of the coming of the day of judgment. Next to the belief in God, that in angels forms a prominent dogma. Created of fire, and endowed with a kind of uncorporeal body, of no sex, they stand between God and man, adoring or waiting upon God, or interceding for and guarding man. The four chief angels are Gabriel, 'The Holy Spirit' or 'Angel of Revelations;' Michael, the special protector and guardian of the Jews; Raphael (Azraël, Azraîl), the 'Angel of Death;' and Uriel (Israfîl), whose office it will be to sound the trumpet at the Resurrection. Islam borrowed its ideas of the unseen world from the Persians or from the Jews, who had borrowed them from the Persians (see ANGEL). To each human being are appointed two guardian angels. Besides angels, there are good and evil genii, the chief of the latter, who are

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generally called Ifrît, being Iblîs ('Despair'), once called Azazil, who, refusing to pay homage to Adam, was rejected by God. These jinn are of a grosser fabric than angels, and subject to death. They are, in almost every respect, like the Shêdim in the Talmud and Midrash. A further belief is in certain God-given Scriptures, revealed successively to the different prophets. Four only of the original one hundred and four sacred books—the Pentateuch, the Psalms, the Gospel, and the Koran—are said to have survived; the three former, however, in a mutilated and falsified condition. The number of prophets, sent at various times, is stated variously at between two and three hundred thousand, among whom 313 were apostles, and six were specially commissioned to proclaim new laws and dispensations, which abrogated the preceding ones. These were Adam, Noah, Abraham, Moses, Jesus, and Mohammed—the last the greatest of them all, and the founder of the final dispensation.

The belief in the resurrection and the final judgment is the next article of faith. The dead are received in their graves by an angel announcing the coming of the two examiners, Munkir and Nakîr, who put questions to the corpse respecting his belief in God and Mohammed, and who, in accordance with the answers, either torture or comfort him. Concerning the condition of the soul between death and the resurrection Islam has no authoritative teaching. The soul is supposed, according to its rank, either to enter immediately into paradise (as do the prophets), or to partake, in the shape of a green bird, of the delights of the abode of bliss (as the martyrs); while, in the case of common believers, it stays near the grave, or is with Adam in the lowest heaven, or remains either in the well of Zem-Zem or in the trumpet of the resurrection. The souls of the infidels dwell in a certain well in the province of Hadramaut, or, being first offered to heaven, then offered to earth, and rejected by both, are subject to unspeakable tortures until the day of resurrection. Concerning the latter, great discrepancy reigns among the Mohammedan theologians. Mohammed himself seems to have held that both soul and body will be raised; and the 'bone Luz' of the Jewish Haggadah was by him transformed into the bone Al Ajb ('the rump-bone'), which will remain uncorrupted till the last day, and from which the whole body will spring anew, after a forty days' rain. Among the signs by which the approach of the last day may be known—nearly all taken from the legendary part of the Talmud and Midrash—are the decay of faith among men, the advancing of the meanest persons to highest dignities, wars, seditions, and tumults, and consequent dire distress. The sun will rise in the west, the Beast will appear, Constantinople will be taken by the descendants of Isaac, the Mahdi (q.v.) will come, the Dejjâl or arch-impostor also will come and be killed by Jesus at Lud. There will further take place a war with the Jews, the coming of Gog and Magog (Yâyûj and Mâjûj's), a great smoke, an eclipse, the Mohammedans will return to idolatry, the Káaba will be destroyed by the Ethiopians, beasts and inanimate things will speak, and finally, a wind will sweep away the souls of those who have faith. The time of the resurrection Mohammed himself could not learn from Gabriel: it is a mystery. Three blasts will announce it: that of consternation, of such terrible powers that mothers shall neglect the babes on their breasts, and that heaven and earth will melt; that of examination, which will annihilate all things and beings, save paradise and hell, and their inhabitants; and forty years later, that of resurrection, when all men, Mohammed first, shall have their souls breathed into their restored bodies, and will sleep in their sepulchres until the final doom has been passed upon them. The day of judgment, lasting from one to fifty thousand years, will call up angels, genii, men, and animals. The trial over, the righteous will enter paradise to the right hand, and the wicked will pass to the left into hell; both, however, have first to go over the bridge Al Sirât, laid over the midst of hell, and finer than a hair, and sharper than the edge of a sword, and beset with thorns on either side. The righteous will proceed on their path with ease and swiftness, but the wicked will fall down headlong to hell below.

Hell is divided into seven stories or apartments, respectively assigned to Mohammedans, Jews, Christians, Sabians, Magians, idolators, and, lowest of all, the hypocrites, who, outwardly professing a religion, in reality had none. The degrees of pain, chiefly consisting in intense heat and cold, vary; but Mohammedans and all who professed the unity of God will finally be released, while unbelievers and idolators will be condemned to eternal punishment. Paradise is divided from hell by a partition (Arâf), in which a certain number of half-saints will find place. The blessed, destined for the abodes of eternal delight (Jannat Aden; Heb. Gan Eden), will first drink of the Pond of the Prophet, which is supplied from the rivers of paradise, whiter than milk, and more odoriferous than musk. Arrived at one of the eight gates, they will be met by beautiful youths and angels; and their degree of righteousness (prophets, religious teachers, martyrs, believers) will procure for them the corresponding degree of happiness. Yet, according to the Mohammedan doctrine, it is not a person's good works or merits that gain his admittance, but solely God's mercy. The poor will enter paradise five hundred years before the rich. The majority of the inhabitants of hell are women. The various felicities which await the pious (and of which there are about a hundred degrees), are a wild conglomeration of Jewish, Christian, Magian, and other fancies on the subject, to which the Prophet's own exceedingly sensual imagination has added largely. Feasting in the most gorgeous and delicious variety, the most costly and brilliant garments, odours and music of the most ravishing nature, and above all, the enjoyment of the Hûr Al Oyûn, the black-eyed daughters of paradise, created of pure musk, and free from all the bodily weaknesses of the female sex, are held out as a reward to the commonest inhabitants of paradise, who will always remain in the full vigour of their youth and manhood. For those deserving a higher degree of recompense rewards will be prepared of a purely spiritual kind—i.e. the 'beholding of God's face' by night and by day. A separate abode of happiness will also be reserved for women. The last of the precepts of pure faith taught by Mohammedanism is the full and unconditional submission to God's decree (Islam), and the predestination of good and evil. Not only a man's fortunes, but his deeds, and consequently his future reward or punishment, are irrevocably, and thus unavoidably, pre-ordained (Fate, *kismeh*): a doctrine which is not, however, taken literally by all Moslems, but which has no doubt contributed largely to the success of Islam by inspiring its champions with the greatest contempt for the dangers of warfare.

The Dîn, or practical part of Islam, which contains the ritual and moral laws, inculcates as the chief duties the following four: prayer, almsgiving, fasting, and pilgrimage.

Prayer, 'the key of paradise,' comprises also certain religious purifications, as the most necessary preparations. They are of two kinds: the *Ghasl*, or total immersion of the body, required as a religious ceremony on some special occasions; and

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the *Wudú*, a partial ablution, to be performed immediately before the prayer. This is of primary importance, and consists of the washing of hands, face, ears, and feet up to the ankles—a proceeding generally accompanied at each stage by corresponding pious sentences, and concluded by the recital of the 97th chapter of the Koran. If water be beyond reach, dry dust or sand may supply its place. 'The practice of religion being founded on cleanliness,' the ground or the carpet upon which the believer prays must be as clean as possible, and the use of a special prayer-carpet is therefore recommended. Every Mohammedan is obliged to pray five times in the space of every twenty-four hours. The prayer (Salât) itself consists partly of extracts from the Koran (Fard), partly of pieces ordained by the Prophet without allegation of a divine order (Sunnah). The first time of prayer commences about sunset; the second at nightfall; the third at daybreak; the fourth about noon; the fifth in the afternoon. The believers are not to commence their prayers exactly at sunrise, or noon, or sunset, lest they might be confounded with the infidel Sun-worshippers. These several times of prayer are announced by the Muezzins (q.v.) from the minarets of the mosques. Their chant, sung to a very simple but solemn melody, sounds harmoniously and sonorously down the height of the mosque, through the mid-day din and roar of the cities, but its impressiveness is most strikingly poetical in the stillness of night. The day-call (the Adân) consists chiefly of the confession of faith ('God is most great,' 'Mohammed is God's apostle;' 'Come to prayer, come to security') repeated several times; the night-calls (Ula, the first; Ebed, the second), destined for persons who desire to perform supererogatory acts of devotion, are much longer. The believer often changes his posture during his prayers; and one series of such inclinations of head and knees, prostrations, &c. is called a Rêka. It is also necessary that the face of the worshipper should be turned towards the Kibleh, in the direction of Mecca, the exterior wall of the mosque marking that direction being distinguished by a niche (Mihrâb). All sumptuous and pompous apparel is laid aside before the believer approaches the sacred place; and the extreme solemnity and decorum, the humility, the devotion which pervades it have been unanimously held up as an example to other creeds. The mosques are always open. Women, although not strictly forbidden to enter the mosque, yet are practically not allowed to pray there, lest their presence might be hurtful to true devotion. Besides these prayers, there are others ordained for special occasions, as on a pilgrimage, before a battle, at funerals, during an eclipse, &c. Moslems pray to God only, but implore the intercession of Mohammed, saints, and angels (see MOSQUE). Mohammedanism has no clergy in our sense of the word, the civil and religious law being bound up in one (see MOLLAH, MUFTI).

Next in importance stands the duty of giving alms. These are twofold—legal and voluntary, but the former, once collected by the sovereign, and applied to pious uses, has now been practically abrogated. The latter is, according to the law, to be given once every year, of cattle, money, corn, fruits, and wares sold, at about the rate of from two and a half up to twenty per cent. Besides these, it is usual to bestow a measure of provisions upon the poor at the end of the sacred month of Ramadân.

The duty of fasting follows (see FASTS). During the whole month of Ramadân the Moslem is commanded to refrain from eating, drinking, smoking, smelling perfumes, bathing, and every unnecessary indulgence in worldly pleasure, from daybreak until sunset. From that period till the morning he is allowed to eat, drink, and enjoy himself. The Arabian year consisting of twelve lunar months, it often happens that the Ramadân falls in mid-summer, when the fasting, more especially the abstaining from drinking, is excessively mortifying. None are exempt from this duty save the sick, travellers, and soldiers in time of war; but they are bound to fast an equal number of days during some other months. Nurses and pregnant women are entirely free from fasting. It is Mohammed's special and express desire that no one should fast who is not quite equal to it, lest he might injure his health and disqualify himself for necessary labour. Of the other commendable fast-days the Ashûra, on the 10th of Moharram, deserves special mention. There are very few Moslems that do not keep the Ramadân, even if they neglect their other religious duties; at all events, they all pretend to keep it most strictly, fasting being considered 'one-fourth part of the faith,' nay, 'the gate of religion.'—For the fourth paramount duty of the Mohammedan, the pilgrimage to Mecca, see MECCA.

With the 'positive' ordinances of Islam may also be reckoned the minor and greater festivals. The first (Al-Fetr, or 'breaking the fast'), following immediately upon the Ramadân, begins on the first day of the month of Shawâl, and lasts three days. The second (Eed Al-Korbân, or 'sacrifice') begins on the 10th of Dhu'l Hijjeh, when the pilgrims perform their sacrifice, and lasts three or four days. The weekly day of rest is the Friday, because, from times long before Mohammed, the people used to hold public assemblies for civil as well as religious purposes on that day. When the special Friday service with its Chotbeh or Homily is over, the people are allowed to return to their worldly affairs, if they cannot afford to give themselves up entirely to pleasure or devotion for the rest of the sacred period.

The ancient rite of circumcision is used in Mohammedanism as the badge of the faith. It is commonly performed between the sixth and eighth year. Of the fundamental prohibitory laws of the Koran, one forbids the drinking of wine, which includes all strong and inebriating liquors, as giving rise to 'more evil than good;' and although of late, chiefly through European influence, very many Moslems have lost their religious scruples on that score, and not only secretly but openly indulge in spirits, yet the great bulk of the faithful refuse even to make use of the proceeds of the sale of wine or grapes. Some over-scrupulous believers even include opium, coffee, and tobacco in the prohibition; but general practice has decided differently. The prohibitory laws respecting food resemble closely those of Judaism; blood, the flesh of swine, animals that have died from disease or age, or on which the name of some idol has been invoked, or that have been sacrificed to an idol, or have been strangled, or killed by a blow, a fall, or by some other beast, are strictly forbidden. 'Pure' animals must be slaughtered according to certain fixed rules, and the name of God is to be invoked before the operation, without, however, the usual addition of the benevolent epithets. Fish, birds, and game are mostly allowed for food.

All games subject to chance, such as dice, cards, tables, bets, are considered so wicked that a gambler's testimony is invalid in a court of law. Chess and other games depending on skill, provided that they do not interfere with the regular performance of religious duties, and that they are played without any stakes whatsoever, are allowed by the majority of Moslem theologians. Usury is strictly prohibited. Taking interest upon any loan, however large or small, or profiting in trade

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through any questionable means, save by buying and selling, is severely condemned.

To prevent the faithful from ever falling back into idolatry the laws relating to images and pictures have been made very stringent. Whosoever makes an imitation of any living being, in stone, wood, or any other material, shall on the day of judgment be asked to endow his creation with life and soul, and, on his protesting his inability to do so, shall undergo the punishment of hell for a certain period. The head of law civil and religious is the Calif. His vicegerent in religion is the Grand Mufti or Sheikh ul Islâm, under whom are the whole guild of Ulemâ or experts.

The civil and criminal laws of Mohammedanism, founded both on the Koran and on the Traditions (*Sunna*), are in some instances, where the letter of the written or oral precept allows of various explanations, or where the case in question is not foreseen, interpreted according to the opinion of one of the four great masters of Islam—Abu Hanîfa, Malek Ibn Ans, Shâfeï, Ibn Hanbal—within the pale of their respective sects. The principal points, however, upon which all Mohammedans agree are the following. Polygamy is allowed. 'Take in marriage of the women who please you, two, three, or four; but if ye fear that ye cannot act equitably, one, or those whom your right hands have acquired'—i.e. your slaves. Thus four wives, and a certain number of concubine slaves, is the extent to which a Moslem may legally go. The Prophet's example proves nothing to the contrary, since he was endowed with special privileges. It is moreover added, as an advice, that to marry one or two is quite sufficient for a man. A Moslem may, if urged by excessive love, or if unable to obtain a wife of his own creed, marry a Christian woman or a Jewess, but a Mohammedan woman is not, under any circumstances, to marry an unbeliever. In all cases, however, the child of a Moslem father, whatever the mother's faith, is a Moslem; nor does the wife that is an unbeliever inherit at her husband's death. A simple declaration of a man and woman at the age of puberty, before two witnesses, of their intention to marry each other, and the payment of part of the dowry (which is indispensable, and must amount to at least ten dirhems, or about five shillings) is sufficient for a legal marriage. A girl under age is given away by her natural or appointed guardian, with or without her consent. To see the face of any woman who is neither his wife nor his concubine, and who does not belong to any of the forbidden degrees, is strictly forbidden to the believer. Divorce is an easy thing for a Moslem husband. Twice a man may send away his wife and take her back again without any ceremony; the third time, however, or if he unite the triple divorce in one sentence at once, he dare not receive her again in wedlock until she have been married to another man in the meantime. Mere dislike is sufficient reason for a man to dissolve the conjugal ties, and his saying 'Thou art divorced,' or 'I divorce thee,' together with the payment of part of the wife's dowry, is all that is required from him by the law. A wife, on the other hand, is bound to her husband for ever, unless she can prove some flagrant ill-usage or neglect of conjugal duty on his part; and even then she forfeits part, or the whole, of her dowry. A woman proving disobedient to her husband may be declared by the cadi rebellious, and the husband is no longer bound to maintain her; but he cannot be forced to divorce her under these circumstances. If a slave becomes a mother by her master, and he acknowledges the child to be his own, the child is free, and the mother is to be emancipated at the master's death. A free person wishing to marry his or her slave must first emancipate this slave.

The privilege of primogeniture does not exist in the Mohammedan law, but males generally receive a double share. A person may not bequeath more than one-third of his property, unless there be no legal heirs. Children—whether begotten with the legal wife, or slave, or concubine, or only adopted—and their descendants are the first heirs; next come the claims of wives, parents, brothers, sisters, in their order. Where there is no legal heir the property falls to the crown. The law is very lenient towards debtors, the Koran recommending the creditor to remit a debt 'as alms.' Insolvency and inability to work for the discharge of the claim solve all further obligations. The most conscientious performance of all private contracts, however, is constantly recommended in the Koran.

Murder is punishable either with death or by the payment of a fine to the family of the deceased, according to their own pleasure. There must, however, be palliating circumstances in the latter case. Unintentional homicide is expiable by freeing a believer from slavery, and paying to the family a certain sum in proportion to the rank and sex of the deceased. He who has not the means of freeing a believer is to fast for two months, by way of penance. According to the strict letter of the law, a man is not liable to capital punishment for killing his own child or an infidel; but, practically, no difference is generally made by civilised Mohammedan governments in our day: murder is punished with death, and no fine frees the culprit.

The Mosaic law of retaliation, in case of *intentional* wounds and mutilation, holds good also for Islam; that is (not, as has ignorantly been supposed, that the corresponding limb of the offender is to be cut off), a certain proportionate fine in money is to be paid to the injured. The payment for any of the single limbs of the human body, such as the nose, is the full price, the same as for a homicide; for a limb which is found twice, like hand or foot, half; for a finger or toe, the tenth part. Women and slaves have smaller claims. Injuries of a dangerous or otherwise grievous nature pay the full price; those of an inferior kind bring the perpetrator within reach of the lash or cudgel.

The Koran orders theft to be punished by cutting off the chief offending limb, the right hand; the second theft is punishable by the loss of the left foot; the third, of the left hand; the fourth, of the right foot; but the ordinary punishments of imprisonment, hard labour, and the bastinado have been substituted in our days. Not, however, if the property stolen were of easy access to the thief, nor if it consisted of food, since he may have taken this to satisfy the craving of his hunger.

Unchastity on the part of a woman was, in the commencement of Islam, punished by imprisonment for life, for which afterwards, however, stoning was substituted in the case of a married woman, and a hundred stripes and a year's exile in the case of an unmarried free woman; a slave to undergo only half of that punishment. Fornication in either sex is, by the law of the Koran, to be visited with a hundred stripes.

Infidelity, or apostasy from Islam, is a crime to be visited by the death of the offender, if he have been warned thrice without recanting. Equally severe, and not to be averted by repentance or revocation of any kind, is the punishment inflicted for blasphemy—against God, Mohammed, Christ, Moses, or any other prophet.

A further injunction of the Koran, for the carrying out of which the time has well-nigh gone by, is that of making war against the Infidels. He who is slain while fighting in defence and for the propagation of Islam is reckoned a martyr; while a deserter from the holy war is held up as an

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object of execration, and has forfeited his life in this world as well as in the world to come. At first all the enemies taken in battle were ruthlessly slain. Later, however, it became the law to give the people of a different faith against whom war was declared the choice of three things: either to embrace Islam, in which case they became Moslems at once, free in their persons and fortunes, and entitled to all the privileges of Moslems; or to submit to pay tribute—in which case they were allowed to continue in their religion, if it did not imply gross idolatry or otherwise offend against the moral law; or to decide the quarrel by the fortune of war—in which case the captive women and children were made slaves, and the men either slain, unless they became converts at the last moment, or were otherwise disposed of by the prince. The fifth part of the spoil belongs 'to God,' that is, the Sanctuary, to the apostle and his kindred, to the orphans, the poor, and the traveller.

In cases for which subsequent ages found no written rules laid down by the Prophet, traditional oral dicta were taken as the norm, and later still precedents of the califs were binding. Hence contradictions in theory and practice have crept in, according to the different traditions and decisions of the Imâms or expounders of the Law, besides the various interpretations put upon the book itself within the pale of the different Mohammedan sects. The secular tribunals, therefore, not unfrequently differ in their decisions from the judicial tribunals; and the distinction between the written civil Law of the ecclesiastical courts and the common Law, aided by the executive power, is, fortunately for the cause of civilisation, getting clearer and clearer every day.

That part of Islam which has undergone least change in the course of time, and which most distinctly reveals the mind of its author, is also its most complete and its most admirable part—we mean the ethics of the Koran. They are not found, any more than the other laws, brought together in one, or two, or three Surahs, but 'like golden threads' they are woven into the huge fabric of the religious constitution of Mohammed. Injustice, falsehood, pride, revengefulness, calumny, mockery, avarice, prodigality, debauchery, mistrust, and suspicion are inveighed against as ungodly and wicked; while benevolence, liberality, modesty, forbearance, patience and endurance, frugality, sincerity, straightforwardness, decency, love of peace and truth, and, above all, trust in God and submission to His will are considered as the pillars of true piety, and the principal signs of a true believer. Nor must we omit to point out expressly that Mohammed never laid down that doctrine of absolute predestination which destroys all human will and freedom, because the individual's deeds cannot alter one iota in his destiny either in this world or in the next. So far from it, foolhardiness is distinctly prohibited in the Koran (ii. 196). Caution is recommended. And a glance at the whole system of faith, which is built on hope and fear, rewards and punishments, paradise and hell, destined to be man's portion according to his acts in this life, as well as the incessant exhortations to virtue and denunciations of vice, are sufficient to prove that the extreme doctrine of predestination is not in the Koran. But submission to the Lord's will, hope during misfortune, modesty in prosperity, and entire confidence in the Divine plans are supported by the argument that everything is in the hands of the Highest Being, and that there is no appeal against His absolute decrees.

That the worst side of Mohammed's character, the often wanton cruelty with which he pursued the propagation of his faith, should by his successors have been taken as a thing to be imitated is not wonderful if we consider how brilliant the results of the policy of the bloody sword had proved. The progress of the Moslem arms is described in the article CALIF. Eighty years after Mohammed's death Islam reigned supreme over Arabia, Syria, Persia, Egypt, the whole of the northern coast of Africa, and over Spain; and notwithstanding the subsequent strifes and divisions in the interior of this gigantic realm, it grew and grew outwardly, until the Crescent was made to gleam from the spires of St Sophia at Constantinople (1453), and the war-cry, 'Lâ ilâha ill' Allâh!' resounded before the gates of Vienna (1529). From that time, however, the splendour and the power of Mohammedanism began to wane. Two hundred millions, or 14 per cent. of the human race, profess Islam. Two-thirds of these are found from Turkey to farthest Malaysia, the rest in Africa. There are upwards of 45 millions of Moslems in British India alone. Among the African races Mohammedanism has lately made great progress. Yet since it left off conquering it has lost also that energy and elasticity which promises great things. Its future fate will depend chiefly on the progress of European conquest in the East, and the amount of Western civilisation which it will, for good or evil, import thither.

The strong points of Mohammedanism, its sobriety, its pure theism, its simple and intelligible creed, are heavily counterbalanced by its slavery, its degradation of woman, its stereotyping of laws and science, and its belief in the past rather than in the future. Yet over a great part of the world it is what Mohammed declared every prophet before him to have been, a pioneer of better things.

Besides the Koran, the Sunna, and the native (Arabic, Persian, Turkish, &c.) writers on the foregoing subject, we mention as further references the works of the European scholars D'Herbelot, Sale, De Sacy, Hammer-Purgstall, Burckhardt, Sprenger, Burton, Muir, Garcin de Tassy, Lane, Weil, Geiger, Nöldeke, Kremer. See also the articles on ARABIA, CALIF, CRUSADES, DEMONOLOGY, KORÂN, MECCA, SHIITES, SUNNITES, TURKEY, WAHÂBIS.

Mohammed, the name of four sultans of Turkey, of whom the most noted is MOHAMMED II., the conqueror of Constantinople; born 1430, succeeded 1451, died 1481. See TURKEY.

Mohammerah (*Muhammrah*), a town of Khuzistan, Persia, near the Turkish frontier. It stands on the lower Karun, where the latter connects by the Haffar Canal with the Shat-el-Arab. It has about 5000 inhabitants, and has become of commercial importance since the opening of the navigation of the Karun (q.v.).

Moharram, or MUHARREM, the first month of the Mohammedan year, kept by the Shiite Mohammedans as a month of fasting and mourning, in commemoration of the sufferings of Hassan and Hussein (Hasan and Hosain), nephews of the Prophet. A celebrated passion-play (Eng. version by Sir Lewis Pelly in 1879) is performed during this month in honour of the two saints at several towns in Persia and India.

Moha've Desert, a basin, with little water or vegetation, chiefly in the SE. of California, and extending into Arizona. The Mohave River rises in the San Bernardino range, and finally disappears in the Mohave Sink.

Mohawks. The Mohock or Mohawk Club, mentioned in the *Spectator* by Steele (No. 324) and Budgell (No. 347), was a scandalous club existing in London in 1711–12. 'The avowed design of their institution was mischief.' Gay mentions, in *Trivia*, that the Mohawks rolled

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women in hogsheads down Snowhill, and Swift told Stella of a report that eighty of them had been put into prison; while Lady Wentworth, writing to her son Lord Strafford, says, 'I am very much frightened with the fyer, but much more with a gang of devils that call themselves Mohocks.' A royal proclamation was issued against them, March 18, 1712.

Mohawks. See IROQUOIS.

Mohic'ans, or MOHEGANS, a warlike sub-tribe of Delaware Indians, which in the 17th century settled in Connecticut, and afterwards helped the English against the French, and the colonists against the English. Of the few survivors, some remain at Norwich, and the rest are in Kansas and at Green Bay, Wisconsin. Their name has become widely known through Cooper's novel, *The Last of the Mohicans.*

Mohileff, or MOGILEFF, the capital of a government in European Russia, is situated on the right bank of the Dnieper, 95 miles SW. of Smolensk. It is the seat of a Greek and a Roman Catholic archbishop, their respective cathedrals dating from 1780 and 1692, and has an old castle, and a town-house built in 1679. Tanning is the principal industry. There is an active trade in cereals, leather, brandy, salt, sugar, fish, timber, &c. Pop. (1885) 41,899, two-thirds being Jews. The town was burned down by Peter the Great for strategical reasons in 1708. Here on 23d July 1812 the French under Davoût defeated the Russians under Bagration.—The *government* has an area of 18,551 sq. m. and a pop. (1887) of 1,294,116.

Mohileff, or MOGILOFF, a town of Podolia, Russia, is situated on the left bank of the Dniester, 190 miles NW. of Odessa. Pop. (1884) 18,421.

Mohl, JULES, orientalist, was born at Stuttgart, 25th October 1800, and educated for the Lutheran Church at Tübingen. But at an early age he was irresistibly attracted to oriental studies, and in 1823 he betook himself to the famous Silvestre de Sacy and Rémusat at Paris. He was nominally professor at Tübingen from 1826 to 1833, but he lived all his life in Paris, becoming a member of the Institute in 1844, and professor of Persian at the Collége de France in 1847. He was long secretary to the Société Asiatique, and his admirably learned and luminous annual reports on the progress of oriental learning were collected by Madame Mohl, under the title *Vingt-sept Ans d'Histoire des Études Orientales* (2 vols. 1879–80). His great edition of the *Sháh Námeh* was published in six folio volumes, from 1838 till 1868; a posthumous seventh volume, edited by Meynard, completed the gigantic undertaking in 1878 (Fr. trans., 7 vols., in same year). Mohl died 3d January 1876. He was a scholar of altogether unusual breadth of mind, and exercised a wide influence on his contemporaries, to which his charming and accomplished wife, *née* Mary Clarke, contributed in no small degree. Her salon was one of the few centres at Paris of high thinking, refinement, and brilliant talk in the degradation of the Second Empire.

See Kathleen O'Meara's *Madame Mohl: her Salon and Friends* (1885); Mrs Simpson's *Letters and Recollections of Julius and Mary Mohl* (1887); and Max-Müller's *Biographical Essays* (1883).

Möhler, JOHANN ADAM, Roman Catholic theologian, was born at Igersheim, in Würtemberg, May 6, 1796, and studied at the university of Tübingen, where, after being theological tutor, he became ordinary professor of Theology in 1828. His earliest publication was a treatise *On the Unity of the Church* (1825), which was followed, in 1827, by a historico-theological essay on Athanasius. But his reputation, both posthumous and among his own contemporaries, rests mainly on his well-known *Symbolik*, a work on the doctrinal differences between Catholics and Protestants, as represented by their public confessions of faith (1832). This remarkable book passed through five large editions in six years, was translated into all the leading languages of Europe, and drew forth numerous criticisms and rejoinders, the most considerable of which is that of Baur (q.v.), 1833. To this Möhler replied in 1834, and next year he accepted a professorship in the new university of Munich. He died April 12, 1838. His miscellaneous works were collected and published posthumously (2 vols. 1839–40) by Dr Döllinger.

Moidart. See INVERNESS-SHIRE.

Moidore, a former gold coin of Portugal, worth 27s. sterling.

Moir, DAVID MACBETH, a minor Scottish poet and humorist, was born at Musselburgh, January 5, 1798, and practised there as a physician till his death, July 6, 1851. He was much beloved by his friends for his amiability, and he earned a wide popularity, and made his pen-name of *Delta* (Δ) famous in Scotland at least by his verses contributed to *Blackwood's Magazine.* Of these a collection was made by Thomas Aird in 1852. Of more lasting merit is his genuinely humorous and still popular *Autobiography of Mansie Wauch* (1828). Other books of less value were *Outlines of the Ancient History of Medicine* (1831) and *Poetical Literature of the Past Half-century* (1851).

Moira. See HASTINGS.

Moire (from the French verb *moirer*, to water silk in a large pattern, as distinguished from *tabiser*, to water or wave it in a small pattern), silks figured by the peculiar process called 'watering.' The silks for this purpose must be broad and of a good substantial make; thin and narrow pieces will not do. They are wetted, and then folded with particular care, to ensure the threads of the fabric lying all in the same direction, and not crossing each other, except as in the usual way of the web and the warp. The folded pieces of silk are then submitted to an enormous pressure, generally in a hydraulic machine. By this pressure the air is slowly expelled, and in escaping draws the moisture into curious waved lines, which leave the permanent marking called watering. The finest kinds of watered silks are known as Moirés antiques.—The same process has been applied to woollen fabrics called Moreen, which is only an alteration of the word moire.

Moissac, a town in the French department of Tarn-et-Garonne, on the river Tarn, 111 miles SE. of Bordeaux. It has a very interesting church, built between 1100 and 1400. Pop. 5692.

Mokanna. HAKIM BEN ALLAH, called AL-MOKANNA, 'The Veiled,' was the founder of a sect in Khorassan, who first appeared in the 8th century, during the reign of Almahdi, the third Abasside calif. He commenced his career as a soldier. In a fight, an arrow pierced one of his eyes, and in order to hide this deformity he henceforth constantly wore a veil, a habit attributed by his followers to the necessity of shrouding from the eye of the beholder the dazzling rays which issued from his divine countenance. Mokanna set himself up as an incarnation of God. Among other miracles, he is said to have caused a moon or moons to issue from a deep well. Mokanna found many adherents, and his little band increased so that ere long he was able to seize upon several fortified places. But Almahdi marched against him, and after a long siege took his stronghold of Kash (780 A.D.), when, together with the remnant of his army, the veiled one took poison.

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Mola, a seaport of Italy, on the Adriatic, 12 miles by rail SE. of Bari. Pop. 12,070.

Mola di Gaeta. See FORMIA.

Molasses. See SUGAR.

Mold, a town of Flintshire, on the Alyn, in a rich mineral district, 14 miles by rail W. by S. of Chester. Its fine 15th-century church, rich in stained glass, contains the grave of the painter Wilson. The former county prison, recently built at a cost of £25,000, was sold in 1880 for £3500 to expelled French Jesuits, who renamed it St Germanus' House, in memory of the 'Alleluia Victory' hard by (see GERMANUS). With Flint, &c., Mold returns one member. Pop. (1851) 3432; (1886) 5055.

Moldau (Bohemian *Vltava*), the chief river of Bohemia, and an important tributary of the Elbe, rises in the Böhmerwald Mountains, on the south-west frontier, at an elevation of 3870 feet above sea-level, and flows south-east to Hohenfurt, where it bends northward, and pursues that direction to its confluence with the Elbe opposite Melnik, after a course of 278 miles. Its course to the point of confluence is longer than that of the Elbe, and the navigation of that river is greatly facilitated by the body of water which it contributes. It receives on the left the Wotawa and the Beraun, and on the right the Luschnitz and the Sazawa. The chief towns on its banks are Budweis and Prague. It becomes navigable from Budweis.

Moldavia, formerly a principality, now forming the northern division of the kingdom of Roumania (q.v.).

Mole (*Talpa*), a genus of quadrupeds of the order Insectivora and family Talpidæ. In structure and habits all the species, seven in number, essentially resemble the Common Mole (*T. europæa*). This animal is found in the southern and central parts of Europe, extending northwards as far as to the shores of the Baltic and throughout Denmark, also in central Asia as far as to the confines of China. In Britain it is very plentiful, but it is not found in Ireland, nor in the western islands of Scotland, except in Mull. It possesses a plump, nearly cylindrical body, covered with a velvet-like coat of short soft fur of a black or blackish-brown colour inserted perpendicularly to the skin, very short stout limbs with naked flesh-coloured feet, a short scaly tail furnished with long stiff hairs, and a pointed muzzle. The total length is about

Fig. 1.—Common Mole (*Talpa europæa*).

6 inches, of which the tail measures about half an inch. It has no external ears, and its eyes are so minute as to be easily overlooked. By its bodily structure it is so eminently fitted for underground progression that it might almost be said to swim through the soft earth. Its whole skull is like a wedge, and its nose is a borer fastened to the sharp end of the wedge. The nostrils are elastic and flexible tubes of cartilage, strengthened by a little bone, and moved by special muscles. The fore-limb is enclosed in the skin of the body up to the wrist. The fore-feet are extremely broad and strong, the palm is turned outwards and backwards; the last phalanges are much longer than the others, are bifurcated, and have strong claws firmly attached to them. The wrist is composed of short and compact bones, and from its inner side there springs a long sickle-shaped bone which runs forward towards the first digit, strengthening the hand and increasing its breadth. The elbow process is long, thus giving greater leverage to the arm than usual. The bone of the upper arm is short, broad,

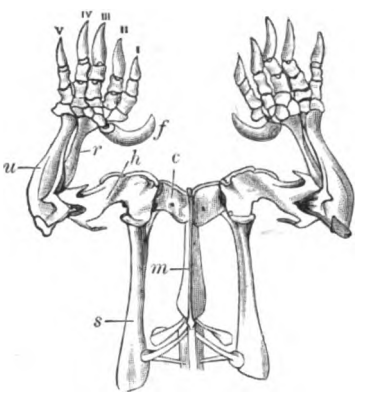

Fig. 2.—Shoulder Girdle and Fore-limbs of the Common Mole:

s, shoulder-blade, or scapula; *c*, collar-bone, or clavicle; *m*, manubrium; *h*, humerus; *u*, ulna; *r*, radius; *f*, falciform or sickle-shaped bone of the wrist; i to v, the digits.

flattened at both extremities, and contracted in the middle, and has upon it very prominent ridges for the attachment of the muscles moving the shoulder-joint. These ridges give it a most peculiar appearance, different from anything found among mammals. The shoulder-blade has the form of a long stout triangular rod. The breast-bone has its fore-part (manubrium) longer than the body and keeled below and expanded. The collar-bone is short, almost cuboid, and is placed at some considerable distance in front of the ribs, thus allowing the fore-limb to be brought very close to the head in burrowing. The hind-limbs are more slender, and are used only for purposes of progression. The incisor teeth are small and sharp, the upper canine is long and possesses a double fang. There are three nearly equal conical premolars and a fourth much larger: the true molars are broad, with many sharp conical projections. The dentition is represented by the formula i. $\frac{3}{3}$ c. $\frac{1}{1}$ p. $\frac{4}{4}$ m. $\frac{3}{3}$ = 44. The senses of hearing, taste, and smell are very strongly developed. The eye is extremely small, with a nearly globular lens and a minute optic nerve, and is at least sensitive to light. The mole is an exceedingly voracious animal; his appetite is a sort of frenzy—a 'rage of hunger.' Vegetable substances form no part of his diet. Earthworms, the larvæ of various insects, mice, small birds, lizards, frogs, even weaker individuals of his own species, all fall victims to his ravages. His practice is to throw himself, in a state of violent excitement as if maddened with rage, on his prey, and immediately, if it is a bird or a quadruped he has captured, to tear open its abdomen and satiate himself with blood. His favourite food is earthworms, and in quest of them, and guided chiefly by the sense of smell, he works his way underground, throwing up the earth in mole-hills; more rarely in fine summer nights he seeks for them on the surface of the ground, where he is himself in turn likely to be

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picked up by some hungry owl. The mole's digestion is very rapid; after a feast he falls into a profound sleep, but from this he soon wakes prepared for another raid. If deprived of food for even a short time he perishes. His thirst, too, is very great, and where there is a colony of moles it is said that a run is always made towards the nearest ditch or pond, and also that where water cannot be conveniently reached deep perpendicular shafts are sunk into the ground, at the bottom of which water is always found.

The habitation of the mole is a very remarkable structure. Each mole has his own encampment, but sometimes two or three moles may be sufficiently sociable to share a common passage. It consists of a hillock of earth larger than an ordinary mole-hill, and containing two circular galleries, one above the other, with five connecting passages, and a

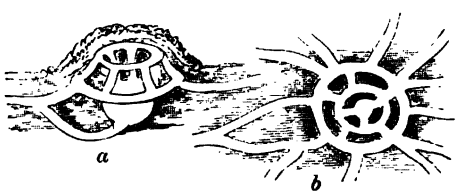

Fig. 3.
a, section of the habitation of the mole; *b*, plan of ditto.

central chamber which has access to the upper gallery by three passages; whilst about nine passages lead away from the lower gallery in different directions. The end of a passage entering a gallery on one side is usually not opposite to the end of a passage entering on the other. To afford all facility of escape in case of any alarm, a passage leads at first downwards from the central chamber, and then upwards till it joins one of the high roads, kept open for access to the moles' hunting-grounds or for escape in time of danger. Moles pair early in spring. As the males exceed the females in number there is often a search for the females and a fierce struggle for possession of them. The shallow tracks running in all directions which are made by the mole when in search of a partner are called by French naturalists *traces d'amour*. The nest in which the female mole produces her young is not the encampment that has been described, but is a chamber lined with dried grass, leaves, and fine roots, formed generally under a mole-hill rather larger than usual at the point of meeting of two or three ordinary passages, at some distance from the fortress. Only a single litter is produced in the year, consisting of four or five young, rarely more. The attachment of the parent moles to their young and also to each other seems to be very strong.

Of all British mammals moles are the most constantly and determinedly persecuted. They are regarded by farmers and gardeners as a pest owing to the injury done to lawns and pastures by their burrows, and to young plants in their search for grubs; and mole-catching has long been practised in Britain as an extensive trade. Capture is effected by inserting traps of various kinds in the runs made by the moles, which catch them as they pass. It is a question, however, whether moles do not fully compensate for the injury they do by destroying many insects and other noxious animals.

Another species of mole (*T. cæca*) is found in the most southern parts of Europe, very similar to the common mole, but rather smaller, and having its eyes covered by a membrane which is pierced only by a minute hole, so that it justifies Aristotle's assertion that the mole is blind. Among the other Talpidæ are the Cape Golden Mole (*Chrysochloris capensis*), which exhibits splendid metallic reflections, and is remarkable in not having the clavicle short and the manubrium of the sternum expanded and keeled, but in having the chest-wall hollowed out for the lodgment of the fore-limb; the Shrew Mole (*Sculops*), a genus to which the most common American moles belong, so called from its resemblance in dentition to the shrews; and the Star-nosed Mole (*Condylura*), also American, and found from Canada to Florida, having the end of the nose surrounded by about twenty fleshy radiating filaments, which are movable, and serve as organs of touch.

Fig. 4.
a, side, and *b*, front view, of the nose of the Star-nosed Mole, natural size.

The name mole is abbreviated from the old English name *Mouldwarp* or *Mouldiwarp*, still provincially used, which is derived from the Anglo-Saxon *molde*, 'mould,' and *weorpan*, 'to throw up.' Cf. Ger. *Maulwurf*. For moles on the person, see NÆVUS; for masonry moles, see BREAKWATER.

Molé, MATTHIEU LOUIS, COMTE, a statesman, descendant of Matthieu Molé (1584–1656), the mediator between the king of France and the parlement of Paris during the troubles of the Fronde, and son of Edouard Molé, president of the parlement in 1788, was born at Paris, 24th January 1781. As soon as the storms of the Revolution were assuaged, Molé returned to France, and made his début in public life with *Essai de Morale et de Politique*, in which he vindicated the government of Napoleon on the ground of necessity. The emperor appointed him Master of Requests, and eventually raised him (1813) to the dignity of a count, and to a place in the cabinet. Louis XVIII. made him a peer in 1815, and in the same year he was appointed minister of Marine. After Louis-Philippe ascended the throne he became minister of Foreign Affairs, but at the end of a few months gave place to the Duc de Broglie. In 1836 he succeeded Thiers as prime-minister; his ministry was unpopular, and in 1839 he appealed to the electors, but unsuccessfully. Henceforward he took little part in political affairs, except that after the revolution of 1848 he exerted himself, though in vain, to rally and unite the party of order in the Assembly, to which he had been elected. He died at Champlâtreux, 23d November 1855.

Mole-cricket. See CRICKET.

Molecule. The smallest mass of any substance which can exist in the free state without modification, through subdivision, of its chemical constitution or of its physical properties. Molecules are held to be of definite size and mass; and any piece of apparently homogeneous matter is held to be made up of molecules or granules which conjointly make up the aggregate mass. That matter, apparently homogeneous, is really granular in this sense, appears firstly from the following physical considerations: (1) Compressibility and porosity show that matter does not fill space; (2) dispersion of light by the prism would be impossible if the glass were homogeneous; (3) chemical combination is attended with the absorption or evolution of limited amounts of heat; (4) soap films require energy to stretch them, and if they could be attenuated beyond a certain limit the energy applied in stretching them would be more than sufficient to volatilise them; (5) the kinetic theory of gases, when numerically worked out, shows the number of molecules in a given space to be limited (see MATTER). These considerations lead to the conclusion that it is impos-

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sible to have a sheet of matter thinner than from $\frac{1}{1000000000}$ cm. to $\frac{1}{10000000}$ cm. thick; and that a figure of this order represents the diameter of the space occupied by one molecule. From the chemical point of view, the laws of definite proportion and of multiple proportion find their best explanation in the atomic theory; but the chemical atom, which is active, is not the same thing as the physical molecule, which is chemically somewhat inert; as we see, for example, in the contrast afforded by the mutual combination of oxygen and hydrogen when in the nascent state, or when exposed to high temperature, and their want of combination when simply mixed as free gases at ordinary temperatures.

The kinetic theory of gases—that gases consist of molecules in a continual condition of mutual collision and rebound—leads to the theorem (Avogadro's Law) that all gases contain within the same volume, under equal conditions of temperature and pressure, the same number of molecules; and if we assume each molecule to be made up of the masses of a group of chemical atoms sufficient to make up the smallest possible free mass of the chemical substance, then this law is in perfect accord with the observations of Dulong and Petit on the relative densities of gases, which are proportional to the weights of the molecules, as derived from the known atomic weights or combining masses of the elements (see CHEMISTRY).

For this reason it has been usual to ascertain the molecular weight of substances by observation of their gas or vapour density, the molecular weight of hydrogen being reckoned as 2, or that of oxygen as 32. Thus, hydrochloric acid gas, which is 18·25 times as heavy as hydrogen gas, has a molecular weight 36·5, which is equal to the sum of the atomic weights of chlorine (= 35·5) and of hydrogen (= 1). Hydrogen itself has a molecular weight = 2, not = 1, because its molecule is held to be made up of two atoms, each of which has an atomic weight equal to unity; and so with other elementary gaseous or volatile substances. There are abnormalities, however; sulphur vapour has so great a density as to show its molecule to consist, below a red heat, of six atoms, while at higher temperatures it consists of two; iodine vapour at lower temperatures has two, at higher one atom in the molecule; mercury, cadmium, zinc, potassium, and sodium molecules contain one atom each; chlorine and bromine molecules partially break up into single atoms when heated. The molecules of liquids are probably compound; those of solids are almost certainly so, as allotropic modifications and variations in crystalline form show, though the vapours, produced from these various forms, if the solids be volatile, are identical. Other and more convenient means of measuring molecular weights have recently become known. These are—(1) a solid dissolved in a liquid lowers the vapour pressure (or 'vapour tension') of that liquid by an amount which bears to the original vapour pressure at the particular temperature of experiment the same ratio as the number of molecules of the dissolved substance does to the total number of molecules in the solution (Raoult); (2) the freezing-point of a solution is lowered in a similar ratio (Raoult); (3) osmotic pressure (see OSMOSE) is the same as that which would be exercised by the substance dissolved if it were transformed into a 'gas' and made to occupy alone the space occupied by the solution (Van t'Hoff); whence the specific gravity of the 'gas' can be ascertained and the molecular weight of the dissolved substance computed. In all these cases there are abnormalities observed, which are due to dissociation or breaking up of the molecules; these are specially observed in the case of salts and other electrolytic substances. A solution of common salt, NaCl, for example, contains (Arrhenius) very little combined chloride of sodium, the particles of which have split up into monatomic sub-molecules of sodium and chlorine, heavily charged with opposite electricities; and the electrolytic conductivities afford additional means of measuring the proportion of the salt which has thus dissociated. Those acids which thus dissociate most into active sub-molecules are the most active. Heat has also a powerful action in breaking up molecules, and causing either dissociation, as in the case of acetic acid, whose molecules are complex until its vapour is strongly heated; or chemical decomposition, as in many well known reactions. Those compounds whose formation is attended with the evolution of heat have molecules which are generally most stable at low temperatures; those which absorb heat during their formation are, as a rule, most stable at high temperatures. When a substance is heated, the energy imparted to the molecules is not only spent in giving them motion relatively to one another, but also, and in many instances to a still greater extent, in giving the molecules themselves movements of elastic vibration and of rotation; and this disturbed condition affects the stability of the molecule. How the molecules are built up from their constituent molecules in each particular substance and its isomers is a matter now being diligently investigated; the graphic formulæ to be found in all the text-books of chemistry, and which have been of enormous utility in the systematisation and discovery of organic compounds, are beginning to give place to 'stereochemical' formulæ, in which the attempt is made to represent the tridimensional relations of the atoms within the molecule. The forces between molecules vary with their mutual proximity (see MATTER); and many of the observed anomalies in the obedience of Gases (q.v.) to Boyle's Law under varying pressures and temperatures can be reduced to order by taking instead of v, the whole volume occupied by the gas, a term $v - b$, the free space within that volume unoccupied by the molecules of the gas; and instead of p, the external pressure, a term $p + \frac{a}{v^2}$, where $\frac{a}{v^2}$ represents a force of mutual attraction of the molecules. See Ostwald's *General Chemistry* (1890).

Mole-rat (*Spalax*), a genus of rodent quadrupeds of the family Muridæ, having teeth almost like those of rats, but in many respects resembling moles, as in general form, shortness of limbs, concealment of ears, smallness or even rudimentary condition of eyes, and burrowing habits—although their food is altogether different, consisting wholly of vegetable substances, and chiefly of roots. The mole-rats are almost confined to the African continent and to the oriental region; a few species occur in south-east Russia, Greece, and Hungary. *Bathyergus maritimus* of the Cape is a large species which inhabits the sand-dunes of the coast.

Moleschott, JAKOB, physiologist, born at Boisle-Duc in Holland, 9th August 1822, studied medicine at Heidelberg, and taught there physiology, anatomy, and anthropology from 1847 until 1854, when he resigned his chair, the senate of the university having 'warned' him on account of the strong materialistic tendency of his writings. In 1853 he established a private laboratory and worked in it until 1856, when he was nominated professor of Physiology at Zurich; in 1861 he moved to the university of Turin, and in 1878 to that of Rome. He has written *Untersuchungen zur Naturlehre des Menschen und der Tiere* (1856 *et seq.*), *Licht und Leben* (3d ed. 1879), *Kleine Schriften* (2 vols. 1880–87), and other works.

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Moleskin. See FUSTIAN.

Molesworth, MRS (Mary Louisa Stewart), novelist and popular writer for the young, was born of Scotch parentage at Rotterdam, and her childhood was passed in Manchester and Scotland, and partly in Switzerland. She has since lived a good deal abroad. She began to write when very young, and her first attempts were published when she was only sixteen. She was most carefully educated under the superintendence of a very cultivated and accomplished mother, and she owed much to the instruction and direction of the Rev. William Gaskell, husband of the novelist, himself a perfect master of literary style. Her first complete works were written under the *nom de plume* of Ennis Graham, when she was about twenty-four. These were novels entitled *Lover and Husband*, *She was Young and He was Old*, *Not without Thorns*, *Cicely*, and several years later *Hathercourt Rectory* and *Miss Bouverie*. When she was about thirty she began to write for children and was at once successful, and has since held foremost rank in this department. Her children are invariably natural and childlike, they think, speak, and act like real children, and she has command of an easy and graceful flow of language, which carries the reader pleasantly onward. Her children's stories, which now number more than two dozen volumes, include *Tell Me a Story* (1875), *Carrots* (1876), *Tapestry Room* (1879), *Herr Baby* (1881), *Rectory Children* (1890), *The Green Casket* (1890), *Children of the Castle* (1890). She has also contributed largely to the better class juvenile magazines.

Molesworth, SIR WILLIAM, the 'liberator and regenerator of Britain's colonial empire,' was born in London, 23d May 1810, of an old Cornish family, the Molesworths of Pencarrow, near Bodmin. He succeeded as eighth baronet in 1823; studied at Cambridge, at Edinburgh, and in Germany; made the tour of Europe; and sat in parliament for East Cornwall 1832–37, for Leeds 1837–41, and for Southwark from 1845 till his death on 22d October 1855, having accepted office in 1853 as First Commissioner of Public Works under the Earl of Aberdeen, and in 1855 as Colonial Secretary under Palmerston. He was the intimate friend of Bentham and James Mill, and was regarded as the parliamentary representative of the 'philosophical Radicals,' whose organ, the *Westminster Review*, he purchased in 1836, and merged with it the *London Review*, started a year before by him and Roebuck. A great admirer of Hobbes, he edited his complete works (16 vols. 1839–45) at a cost of £6000; but he will chiefly be remembered as having drawn attention to the abuses connected with the transportation of criminals, and as having pointed out the maladministration of the colonial office, investigated the natural relations between the imperial government and the colonial dependencies, and expounded the true principles of colonial self-government.

Molfetta, a seaport and cathedral city of Southern Italy, on the Adriatic, 16 miles by rail NW. of Bari. Pop. 29,697.

Molière (JEAN BAPTISTE POQUELIN, who took this stage-name for reasons not apparent, and every point in whose imperfectly known life has been the subject of elaborate disquisition) was born at Paris, probably in the Rue St Honoré, and early in the year 1622. The house is not certain, and the exact date is unknown, though it appears to have been about the middle of January. His father was Jean Poquelin, his mother Marie Cressé, and the family came from Beauvais, there being no proofs of the Scotch origin which used to be asserted. Poquelin, the father, was a substantial tradesman and *valet tapissier de chambre du roi*, an office combining the arrangement with the supply of furniture. The son was well educated, though the precise details of his education are very uncertain. He is supposed to have studied under the Jesuits at the Collége de Clermont, under Gassendi the philosopher, and under the regular teachers of law. He may have been called to the bar. His mother, who had some property, died when he was ten years old, and thus when he came of age he received his share of her fortune at once, becoming his own master. He declined to follow up his father's business (though it is said that he had already as his representative attended Louis XIII. on a royal progress as *valet tapissier*), hired a tennis-court, and embarked in theatrical affairs with the Béjart family and others, under the style and title of *L'Illustre Théâtre* (1643–46). This first venture lasted for over three years in Paris and failed. The company then proceeded to the provinces and had a sufficient amount of success to keep it going for twelve years, from 1646 to 1658, and to enable its manager to return triumphantly to the capital at the end of that time.

All the pains which have been spent on Molière's history have failed to elaborate any connected or detailed history of these long *Wanderjahre*. We hear most of the troupe at Lyons and in Languedoc; but its range must have been considerable, since it journeyed as far northwards as Rouen. The Prince de Conti (said to have been Molière's schoolfellow) took it under his protection for a time, and Pézenas, near his Languedocian seat of La Grange, is one of the fixed points of Molière's biography. When, Conti having taken to Catholic Methodism, his protection failed, Molière succeeded in obtaining that of the king's brother, Philippe d'Orleans, so that his troupe became the servants of Monsieur. He was now in haste to return to Paris, where he at once received marks of royal favour, played before the king on October 24, 1658, and organised, first in the Petit Bourbon, then, on its demolition, in the Palais Royal, a regular theatre in competition with, if not in opposition to, those of the Hôtel de Bourgogne and the Marais.

During his sojourn in the provinces Molière had acquired considerable experience as a comic writer. Most of his work had been in a style not far removed from that of the old farces, and of this we have only two relics in *La Jalousie du Barbouillé* and *Le Médecin Volant*. But he had also written *L'Étourdi* and the *Dépit Amoureux*, and it is more than probable that some of his still greater work was at least on the stocks before his return to Paris. As a theatre manager he had to give tragedy as well as comedy: he is said to have been mistaken as to his own powers of tragic acting, and he had to depend for his tragedies on others. Corneille's *Nicomède*, with which he opened, was not a success; and though the other great tragedian of the day, Racine, was a personal friend of Molière's, their connection as manager and author was, not at all by Molière's fault, brief and unfortunate. But he did not tarry long before showing the immense resources which he possessed in his own talent as a comic writer. *Les Précieuses Ridicules*, the first essay of 'la bonne comédie,' as a famous story has it, dates, as far as publication is concerned, from November 1659; and from that time to his death on February 17, 1673, no year passed without one, and few years without more than one, of the greatest achievements in their own particular line that the world has seen. Except in one respect, the history of Molière during these fourteen busy years is the history of his work as an author, an actor, and a manager. But the one exception is the most important incident of his life. In the spring of 1662 (perhaps on

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St Valentine's day, perhaps earlier or later, for the exact date, like almost everything else in this history, is disputed) Molière married Armande Claire Elisabeth Grésinde Béjart, an actress in his own company, probably about nineteen years old, and the youngest member of the above-mentioned family of Béjart, whereof two other sisters, Madeleine and Geneviève, and one brother, Joseph, had been members of the Illustre Théâtre. On this marriage scandal, both at the time and since, has exhausted itself. It was and still is, in the teeth not indeed of positive evidence, but of something nearly approaching thereto, maintained that Madeleine Béjart and Molière were not only comrades but lovers, that Armande was not Madeleine's sister but her daughter, even that Molière himself (this crowning calumny was, it seems, started by the jealousy of Montfleury, a rival actor and playwright) was the father of his wife. Not content with this imputation, later scandal asserted that Madame, or, as the time called her, Mademoiselle Molière, was unfaithful to her husband, and contemporary satire asserted that he was at any-rate very jealous of her. Of this last there is, both from internal and external evidence, too much probability; of the graver charge there is as in the other case no evidence, while such evidence as there is is against it. It may be said before going further that Molière was during his whole life at Paris the butt of vehement animosities, professional and other; that before his death (1670) a sort of play, *Élomire Hypochondre* (Élomire = Molière), appeared, written by a certain Le Boulanger de Chalussay, with intent to take revenge for Molière's jests on doctors, which contains much spiteful tittle-tattle; and that long afterwards, in 1688, a venomous libel on his widow, entitled *La Fameuse Comédienne*, threw some mud at him in order to throw more on her. A kind of Molière-legend also sprang up, composed of stories such as the famous but apparently impossible tale of the *en-cas de nuit* or cold collation which Louis XV. shared with Molière in order to overcome the prejudice of his aristocratic *valets de chambre*, that of the old woman to whom he is supposed to have read his plays, that (better grounded than the others) of the marquis who, angry at the actor's satire, rubbed Molière's head against the sharp buttons of his own coat in a feigned embrace, and so forth. Such authentic documents as we have show us a man well-to-do, though not above his work, well thought of by good judges, and living well. In August 1665 the king adopted Molière's troupe as his own servants. In 1667 symptoms of lung disease showed themselves in him, but were for the time checked. On the 17th February 1672 Madeleine Béjart, his comrade of thirty years, if nothing more, died. On the same day next year, after the seventh representation of his last play (see below), Molière died in his own house in the Rue de Richelieu of hæmorrhage from the bursting of a blood-vessel, having struggled through, as no imaginary sick man, the title-part. He was buried, despite the frowns of the church on his profession and himself, in the churchyard of St Joseph, with maimed but not inconsiderable ceremony. But the exact tomb has not been identified. In person he is said to have had a good figure, but not a handsome face. His character would appear to have been extremely generous and amiable, though he seems to have certainly suffered from jealousy, and most probably from hypochondria. Nor is there discoverable in his work, or in anything reported of him, the least excuse for the accusations of irreligion which were brought against him, partly by private malice, partly as retaliation for the terrible attack on religious hypocrisy in *Tartuffe*, and for the misunderstood irony of *Don Juan*. The first-named piece was delayed five years before it could be completely played, and *Don Juan* was stopped and subjected to excisions. Part of Molière's ill-fame in this respect was no doubt due to his earlier associations with Gassendi and to his fondness for that teacher's favourite classic, Lucretius, whose poem Molière himself is said to have translated as a whole.

The dates and titles of Molière's plays are as follows: *L'Étourdi*, *Le Dépit Amoureux* (1658; in the provinces two years earlier); *Les Précieuses Ridicules* (1659); *Sganarelle* (1660); *Don Garcie de Navarre* (1661); *L'École des Maris*, *Les Fâcheux*, *L'École des Femmes* (1662); *La Critique de l'École des Femmes Impromptu de Versailles* (1663); *Le Mariage Forcé*, *La Princesse d'Élide*, *Tartuffe* (partially, 1664); *Le Festin de Pierre* [*Don Juan*], *L'Amour Médecin* (1665); *Le Misanthrope*, *Le Médecin Malgré Lui*, *Mélicerte*, *Le Sicilien* (1666); *Tartuffe* (fully, but stopped after first night, 1667); *Amphitryon*, *George Dandin*, *L'Avare* (1668); *Tartuffe* (at last fully), *Monsieur de Pourceaugnac* (1669); *Les Amants Magnifiques*, *Le Bourgeois Gentilhomme* (1671); *Les Fourberies de Scapin* (1671); *La Comtesse d'Escarbagnas*, *Les Femmes Savantes* (1672); *Le Malade Imaginaire* (1673). To this must be added part of *Psyché* (1671) in collaboration with Quinault and Corneille, the two farces above referred to (which are almost certainly his), attributed to him on the authority of J. B. Rousseau, a few arrangements of court masques, and some miscellaneous poems, the only important one being a copy of verses on Mignard's fresco-work at the church of Val de Grâce.

For posterity, however, Molière is nothing if not a comic dramatist; and the enormous majority of competent suffrages—a majority increasing as years go on—puts him at the very head of all writers of his own particular class. In France he is called a poet; but, though he could manage verse well enough when he chose to write in it, he is almost always best in prose, and his work possesses few, if any, of the more distinguishing and essential qualities of poetry. It is as a dramatist of manners—who more and more adjusted his art to the direct purpose of satirising and, if possible, reforming folly and vice, and who almost alone of all writers that have done this never sacrificed the art to the purpose—that he is absolutely unrivalled. Romantic or poetical comedy, like that of Shakespeare and Calderon, he hardly ever tried (almost the sole successful play in it being *Don Juan*), and it is not very probable that he would have frequently succeeded in it. The time made it impossible for him to be poetical like Aristophanes in subject, and his own genius did not incline him to be fancifully creative like Aristophanes in form. But in the sphere defined above he has no superior, and is very unlikely ever to have an equal. He gradually confined himself to it more and more closely, and always with the result of improvement. Nothing is more instructive than to compare *Les Précieuses Ridicules*, which is almost his first play, with *Les Femmes Savantes*, which is almost his last. They are so closely connected in subject that the later play has sometimes been called an expanded recast of the earlier. But the improvement in treatment is immense. Amusing as *Les Précieuses Ridicules* is, it is not much more than farce of the very best sort. *Les Femmes Savantes* is comedy of the highest kind, the result of exact observation of life informed by intimate knowledge of character, and clothed with the most accomplished phrase. Molière has sometimes been reproached with a leaning towards farce up to the last—exemplified not merely in such avowedly lighter plays as *Le Bourgeois Gentilhomme*, and the two satires on the provincial gentry, *Monsieur de Pourceaugnac* and *La Comtesse d'Escarbagnas*, but

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in passages of his more serious pieces. The objection shows a wholly erroneous conception of comedy itself, and may be said to argue deficiency of humour in one direction. But the merely farcical side predominates, as undoubtedly as naturally in the earlier plays, the serious in the later. It is not till *L'École des Femmes*, perhaps not till *Le Misanthrope*, that the full genius of the author appears; and these two, with *Tartuffe*, *Le Festin de Pierre*, *Les Femmes Savantes*, *Le Malade Imaginaire*, and perhaps the admirable *Bourgeois Gentilhomme* as an example of the lower kind, may be said to be Molière's masterpieces. But from the *Dépit Amoureux* onward no play of his, not even the slightest, is without touches of his admirable wit, his astonishing observation, his supreme power over his own language, his masterly satire. It can hardly be said that any class of men or any prominent trait of mankind is spared by this satire, but undoubtedly three subjects—the vanity and levity of women, the frivolity of the nobles, and the pedantic professionalism of the learned classes, especially of medical men, have the largest share of Molière's lash. He has been accused of taking too low a view of human nature, but this again seems to come from a mistake in appreciating the conditions of his work. He also was and is accused of plagiarism; and it is quite true that in his early pieces especially he avails himself of existing canvas for his own embroidery freely. The best defence of the practice is the boldest: that any man who can embroider like Molière does only too well to requisition canvas where and to what extent he likes. Of another, a subtler, and a less easily refuted observation—that, admirable as his criticism of humanity in general is, his characters tend too much to types, and are lacking in the individuality which Dante and Shakespeare give—we have no room to speak fully. Indeed, much more space than can be here afforded would be insufficient to discuss even most briefly the various aspects of his genius. We must content ourselves with saying that of all French writers he is that one whose reputation stands highest by the combined suffrage of his own countrymen and of foreigners, that at his best he keeps the stage with perfect ease and success after two hundred years, and that he is almost everywhere delightful in the study for his wonderful truth to nature and his not less wonderful expertness in art.

As hinted above, the bibliography of Molière is very voluminous. The first complete edition of his work was edited in 1682 by his friends and comrades, La Grange and Vinot. The last, and by far the best, complete as to text, but still wanting life, lexicon, &c., is that of Despois and Mesnard in the series of *Les Grands Écrivains Français* (9 vols. 1873–86). The bulk of recent work on Molière (for ten years there existed a special periodical called the *Molièriste*) has not been fully digested into any Life. That of Taschereau, though old, is perhaps still the best, but the completest is the German Life of Mahrenholtz (Heilbronn, 1881). M. Loiseleur's *Points Obscurs de la Vie de Molière* has been a great centre of discussion, and an excellent collection of studies will be found in M. Larroumet's *La Comédie de Molière*. The Life to be prefixed to the above-named *Grands Ecrivains* edition will probably be a complete digest of the whole subject; as to which it is improbable that any new facts will now be found, every source having long since been ransacked. There are excellent editions by Anatole France in the 'Collection Lemerre' (7 vols. 1876–91), with notes by G. Monval in the 'Librairie des Bibliophiles' (8 vols. 1882). There is a special *Bibliographie Molièresque* (1875); and there are translations by Van Laun (1875–77) and Heron Wall (1876–77).

Molina, Luis, a celebrated Spanish Jesuit theologian, was born at Cuenca, in New Castile, in the year 1535, and, having entered the Jesuit Society in his eighteenth year, studied at Coimbra, and was appointed professor of Theology at Evora, where he continued to teach for twenty years. He died at Madrid, 12th October 1600. Molina's celebrity is mainly confined to the theological schools. His principal writings are a commentary on the *Summa* of St Thomas Aquinas (1593); a minute and comprehensive treatise, *De Justitia et Jure* (1592); and the celebrated treatise on the reconciliation of grace and free-will (*Liberi Arbitrii cum Gratiæ Donis . . . Concordia*), which was printed at Lisbon in 1588, with an appendix, printed in the following year. The problem which the latter work is meant to resolve is almost as old as the origin of human thought itself, and had already led, in the 4th century, to the well-known Pelagian controversy (see Pelagius). In reconciling with the freedom of man's will the predestination of the elect to happiness, and of the reprobate to punishment, Molina asserts that the predestination is consequent on God's foreknowledge of the free determination of man's will, and, therefore, that it in no way affects the freedom of the particular actions, in requital of which man is predestined whether to punishment or to reward. God, in Molina's view, gives to all men sufficient grace whereby to live virtuously, and merit happiness. Certain individuals freely co-operate with this grace; certain others resist it. God foresees both courses, and this foreknowledge is the foundation of one or the other decree. This exposition was at once assailed in the schools on two grounds—first as a revival of the Pelagian heresy, inasmuch as it appears to place the efficacy of grace in the consent of man's will; second, as setting aside altogether what the Scriptures represent as the special election of the predestined. Hence arose the celebrated dispute between the Molinists and the Thomists—both of whom, however, maintained that, in all circumstances, the will remains free, although they may fail to explain how this freedom is secured under the action of efficacious grace. It was first brought under the cognisance of the Inquisitor-general of Spain, by whom it was referred to Pope Clement VIII. This pontiff, in 1598, appointed the celebrated congregation De Auxiliis to consider the entire question; but, notwithstanding many lengthened discussions, no decision was arrived at during the lifetime of Clement; and although the congregation was continued under Paul V., the only result was a decree in 1607, permitting both opinions to be taught by their respective advocates, and prohibiting each party from accusing the adversaries of heresy. The dispute, in some of its leading features, was revived in the Jansenist (q.v.) controversy. Molinism has been commonly taught in the Jesuit schools. See Aquinas, Suarez.

Molina, Tirso de. See Tellez.

Moline, a city of Illinois, on the Mississippi, 179 miles by rail W. by S. of Chicago, and separated from Rock Island only by a swift and narrow channel affording great water-power, which is utilised by means of a dam. There are many busy mills and factories here. Pop. (1890) 11,995.

Molinos, Miguel de, was born of noble parentage at Patacina, near Saragossa, December 21, 1640. He received holy orders and was educated at Pampeluna, and afterwards at Coimbra. At Rome he soon acquired a high reputation as a director of conscience and a master of the spiritual life. An ascetical treatise which he published, under the title of *Guida Spirituale*, added largely to the popularity which he had acquired in his personal relations; but there were not wanting many who, in the specious but visionary principles of this work, discovered the seeds of a dangerous and seductive error. Among these the celebrated

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Jesuit preacher Segneri was the first who ventured publicly to call them into question. By degrees reports unfavourable to the practical results of this teaching, and even to the personal conduct and character of Molinos, or of his followers, began to find circulation; and eventually, in the year 1685, he was cited before the Holy Office, and submitted to close imprisonment and examination. In addition to the opinions contained in his book, a prodigious mass of papers and letters, to the number, it is said, of 20,000, found in his house, were produced against him, and he was himself rigorously examined as to his opinions. The result of the trial was a solemn condemnation of sixty-eight propositions, partly extracted or inferred from his *Spiritual Guide*, partly, it would appear, drawn from his papers or his personal professions. These doctrines Molinos was required publicly to abjure, and he was himself sentenced to close imprisonment, in which he was detained until his death, 28th December 1697. The opinions imputed to Molinos may be described as an exaggeration of the principles of Quietism (q.v.)—the utter indifference of the soul, in a state of perfect contemplation, to all external things. See John Bigelow's *Molinos the Quietist* (New York, 1882); J. H. Shorthouse, *Golden Thoughts from the Spiritual Guide* (1884).

Molise. See CAMPOBASSO.

Mollah, among the Turks, is the title of a superior judge. The mollah is an expounder of civil and criminal law, and of the religion of the state; he is therefore necessarily both a lawyer and an ecclesiastic. Under him is the cadi or judge, who administers the law.

Mollendo, a port of Peru, lying SW. from Lake Titicaca. It has railway connection with Puno (107 miles), and thence to Arequipa (218 miles), and enjoys considerable trade; but there is no other inducement to reside there, and the population is only 1500.

Mollusca, a large division of invertebrate animals, including three chief classes: bivalves or Lamellibranchs, 'snails' or Gasteropods, and cuttle-fish or Cephalopods. As these are separately discussed, it will be enough to state the general characters and classification of the series.

General Characters.—Though most cuttle-fish and not a few gasteropods are free swimmers, the average habit of molluscs tends markedly to sluggishness, and with this the calcareous shell of the great majority may be naturally associated. Most of the genera are marine, but there are many fresh-water forms (probably originating 'from the conversion of shallow continental seas into lakes'), while the species of terrestrial snails and slugs are legion. As to diet, the sluggish bivalves feed on microscopic animals and organic debris wafted to the mouth by the gills; the gasteropods are divided into carnivores and vegetarians, omnivorous gluttons and dainty epicures; and the cephalopods are voracious flesh-eaters. In this connection the absence of a rasping tongue in the bivalves, and its presence in all the others should be noticed.

One of the most conspicuous structural characters is the absence of the segmentation and the serial appendages which characterise the arthropods and higher 'worms.' The typical mollusc is bilaterally symmetrical, as may be seen in bivalves and in those gasteropods of which Chiton (q.v.) is a representative, but in the majority of gasteropods the body is markedly lop-sided. This condition is referred by Lankester to the exaggerated vertical growth of the viscera into a dorsal hump surmounted by a shell, which in creeping animals will tend to fall to one side, and thus produce torsion. With the skin, which is soft and glandular, and often ciliated, two very characteristic structures are connected on the dorsal surface, the one a small pit constant in the embryo—the primitive shell-sac or shell-gland; the other a fold of skin overlapping the sides and forming the 'mantle.' From the latter a very varied permanent shell is usually formed as a cuticular product composed of carbonate of lime and an organic basis. Its thickness seems often to bear some relation to the external and internal activities of the mollusc, for it is thin in the active scallop (Pecten) and Lima, thick in the passive oyster and Tridacna, slight or absent in the pelagic Pteropods (sea-butterflies) and in the active Cephalopods, but heavy in most of the slowly creeping littoral forms. But that this is only one condition of shell-development is evident in many ways—for instance, when we compare land-snails with slugs; for the latter, though hardly less sluggish than the former, are practically shell-less. Another very distinctive structure is the molluscan 'foot,' a muscular protrusion of the ventral surface, usually locomotor in its function, but turned to various uses, and degenerate in the most sedentary bivalves, especially in the oyster.

As to the less obvious general characters, the nervous system consists typically of a pair of cerebral ganglia, connected to a pair of pedals and to a pair of pleurals, the latter associated with a visceral nerve-loop which may also be ganglionated. In the cephalopods, and in most gasteropods, the three chief pairs of nerve-centres are closely united in the head, but in the symmetrical chitons a much more primitive, and in the bivalves a much less concentrated arrangement obtains. The sense-organs vary greatly, but there may be tentacles like the snail's 'horns,' head-eyes like those so well developed in most cuttle-fish, while a pair of ear-sacs or otocysts in the front of the foot and a smelling-patch or osphradium at the base of the gills are all but constant. On the edge of the mantle of many bivalves, or penetrating the shell-plates in Chiton, there is quite a plethora of eyes, some of which are imperfectly visual and possibly light-absorbing in function. The food-canal includes in the mouth-region a toothed ribbon, absent in bivalves, and bears further back a digestive gland often of large size. The long coils of the gut are depressed ventrally into the foot of bivalves, and are protruded as if in a hernia on the dorsal surface of most gasteropods. The heart, absent only in Dentalium and related genera, lies dorsally in a special portion of the body-cavity known as the pericardium, and drives colourless blood through the body, thence into the gills and kidneys, whence it returns purified. The gills are vascular outgrowths of the body-wall, usually sheltered by the mantle, which in the terrestrial forms like the snail makes a lung-like chamber. A paired or single kidney connects the pericardium with the exterior. The reproductive organs—unisexual or hermaphrodite—vary extremely, from great simplicity in most bivalves to an extraordinary degree of complexity in many gasteropods, such as the snail.

In their *life-history* most molluscs pass through two larval stages. The first is a somewhat barrel-shaped form, with a ring of cilia in front of the mouth; it is known as a trochosphere, and is quite like the young stage of many 'worms.' This passes, however, into another more characteristic phase called the Veliger, which bears on its head a ciliated area or locomotor 'velum' often produced into lobes, has its body already characterised by a visceral hump and a ventral foot, and possesses on its dorsal surface the little shell-gland already mentioned. In the cephalopods, whose ova are rich in yolk, the trochosphere and veliger stages are skipped over, and there are also notable

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modifications in the development of terrestrial and fresh-water molluscs.

Classification.—Branch A. Those with a well-developed head and a rasping tongue: Class I.—*Cephalopoda* (q.v.). See also CUTTLE-FISH, NAUTILUS. Class II.—*Gasteropoda*—(*a*) More or less unsymmetrical forms (see GASTEROPODA, also LIMPET, SNAIL, WHELK, &c.); (*b*) Symmetrical and primitive forms—e.g. Chiton (q.v.); (*c*) A distinct sub-class of pelagic forms, the Pteropods (q.v., sometimes called a class, or united with Class I.). Class III.—*Scaphopoda*—A few very distinct forms, of which Dentalium (q.v.) is the best-known representative. Branch B. Those in which the head-region is very slightly developed, and without a rasping tongne: Class IV.—*Lamellibranchiata* or Bivalves (q.v.). See also MUSSEL, OYSTER, &c.

History.—Provided as most molluscs are with substantial calcareous shells, their fossil remains have been to that extent very perfectly preserved, and long series have been traced out with remarkable success. Remains of the great types occur even in the Cambrian rocks, and more abundantly from the Lower Silurian onwards. The earliest Nautilus type of cephalopod has waned away through the ages, and only one genus (see NAUTILUS) now persists, while the cuttle-fish type which appeared much later is still represented by numerous species. As a whole, however, this class seems to have dwindled, for there are towards 4000 fossil species—distributed of course over many ages—as against less than 200 living forms. With the gasteropods, however, the case has been very different, for the number of genera steadily increases from the Cambrian and Silurian onwards, and of the total number of species, computed some years ago at 23,000, the extinct forms are estimated at 7000, the living forms at 16,000, which proves beyond doubt a notable increase in numbers. Nor can we deplore any modern diminution of lamellibranchs, for, although the extinct species are reckoned at about 9000 and the living at about 5000, the former were distributed over a much vaster period, while in some families the number of living species greatly exceeds that of the extinct. As one would expect, the lung-breathing gasteropods and the fresh-water lamellibranchs are both relatively late in appearing.

As to the *pedigree*, some of the characters of the chiton-like gasteropods and the general occurrence of a trochosphere larva suggest the origin of molluscs from some worm-like type, but this is not saying much. Very helpful has been Professor Ray Lankester's attempted reconstruction of the ancestral or archi-mollusc, from which all the

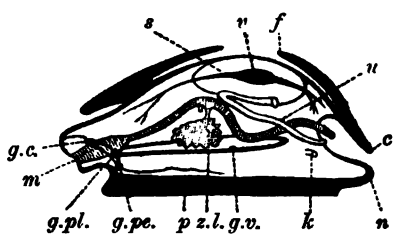

Fig. 1.—Section of Schematic Mollusc (from Lankester).
m, mouth; *g.c.* cerebral, *g.pl.* pleural, *g.pe.* pedal, *g.v.* visceral ganglia; *p*, foot; *z.l.*, left lobe of digestive gland; *k*, genital opening; *n*, posterior end of the foot; *c*, edge of the mantle; *u*, kidney; *f*, edge of primary shell-sac; *v*, ventricle of the heart; *s*, pericardial cavity.

known forms are supposed to have sprung. As will be seen from the figure, this schematic conception combines the general characters which we have noted above. Its descendants must have early divided into two series, the sluggish bivalves, with many structures (e.g. the atrophied head) modified in relation to a sedentary life, and the active aggressive gasteropods and cephalopods, in which the general features of the archi-mollusc are more evidently retained.

As the economic importance of molluscs is recognised in special articles (such as those on Bivalves, Cuttle-fish, Gasteropoda, Mussel, Oyster, Snail, Whelk, &c.), we shall simply illustrate in conclusion their general zoological interest. For a long time the study of molluscs hardly penetrated beyond their shells; but, though this Conchology (q.v.) was often a collecting craze, and sometimes led to positively misleading conclusions, no one will dispute the charm of beauty and variety which these externalities possess, nor deny that their investigation rightly pursued (in relation to the tenanting animals and the surrounding conditions of life) may yield most important scientific results. It is very interesting also to consider how the limits of Mollusca have been gradually changed. As the original title, Malakia, means soft, it is necessary to explain that Aristotle applied it solely to the practically shell-less cuttle-fishes, while Linnæus used the Latinised term Mollusca also in primary reference to naked forms, along with which he included, however, hydroids, annelids, and echinoderms. The shelled molluscs which form the majority of the modern classes he separated

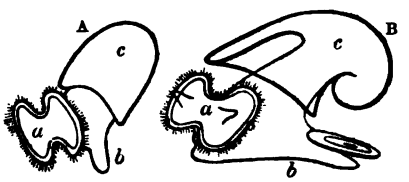

Fig. 2.—Earlier (A) and later (B) 'Veliger' of a Gasteropod (after Gegenbaur).
a, velum; *b*, foot; *c*, visceral dome.

off as Testacea. But strangely enough this last title was gradually replaced by Mollusca, under which Cuvier included not only cephalopods, gasteropods, pteropods, and the 'acephalous' or headless bivalves, but the lampshells or Brachiopods, the Nuda or Ascidians, and the barnacles or Cirrhopoda. In modern times, as a reference to the articles on Brachiopoda, Ascidians, and Cirripedia will show, the researches of Vaughan Thompson, Kovalevsky, Milne-Edwards, and others have entirely freed the class of molluscs from Cuvier's last three divisions. The incomparably careful anatomical work of Lacaze-Duthiers, along with the researches of Kölliker and Gegenbaur, Huxley and Spengel, the embryological discoveries of Ray Lankester and others, and the generalisations which we owe to Huxley and Lankester are notable illustrations of recent progress in the study of molluscs. Moreover, on the problems of evolution no little light has been cast—e.g. by Würtenberger's comparison of the racial and individual development of the Ammonites, by Hyatt's monumental monograph on the evolution of fossil cephalopods, or even by the single chapter in which Hilgendorf worked out the variations of Planorbis in the Upper Miocene beds of Steinheim. In other directions, too, the inquiries of Dall and others into the deep-sea molluscs, the experiments by which Semper was able to impress changes upon various forms by altering their surroundings, Sollas's research on the origin of fresh-water fauna, Lang's study of the influence of sedentary life, Bateson's account of the variations of the cockle, and many other evolutionist investigations have yielded results not less valuable than those of the anatomists.

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See E. Ray Lankester's article 'Mollusca,' *Encyclo. Brit.* (vol. xvi.); Keferstein's 'Mollusca' (1862–66) in Bronn's *Thierreich;* S. P. Woodward's *Manual of the Mollusca* (3d ed. 1875); Hatchett Jackson and Rolleston's *Forms of Animal Life* (1888); and the *Challenger* Reports.

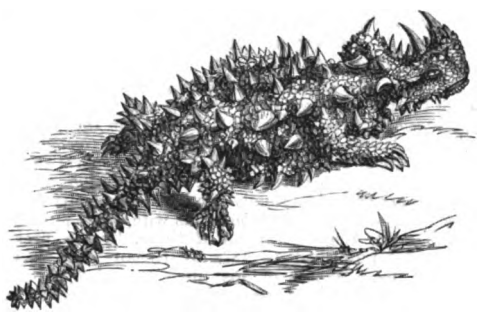
Mollwitz, a village of Prussian Silesia, 7 miles W. of Brieg. An obelisk (1878) marks the battlefield where Frederick the Great with 20,000 Prussians defeated an equal number of Austrians under Marshal Neipperg, April 10, 1741. The Austrians lost 5340 men, the Prussians 5500.

Molly. See FULMAR.

Molly Maguires, an Irish secret society which during the ten years preceding 1877 terrorised the coal regions of Pennsylvania. The name was imported from Ireland, where it had been adopted by a branch of the Ribbonmen whose outrages by night were perpetrated in female disguise (cf. Trench's *Realities of Irish Life*, p. 82). The object of the organisation in Pennsylvania appears to have been to secure for its members, as far as possible, the exclusive political power in the eastern part of the state. Murders were committed in the open day, though much more usually by night; and the terror of the society was on all the coal country until, in 1876–77, a number of the leaders were convicted and executed, mainly by the evidence of a detective named McParlan, who had acted for three years as secretary of the Shenandoah division. See works by Pinkerton (New York, 1877) and Lucy (Lond. n.d.).

Moloch, or more properly MOLECH, is mentioned in 1 Kings, xi. 7, as the 'abomination of the children of Ammon,' and occurs frequently elsewhere in the Old Testament as the name or title of a divinity occasionally worshipped in the kingdom of Judah with cruel rites. The Hebrew form of the word is invariably *Molech*, and it always (except perhaps in 1 Kings, xi. 7) has the article ('the Molech'); the occasional variant *Moloch* in the Authorised Version has come through the Septuagint and Vulgate. The word means 'king,' and is the same (*melech*) as that which appears in composite form in the names of the divinities Adrammelech and Anammelech (2 Kings, xvii. 31), in the title Melkarth (Malk-kart, Melicertes) applied to the Tyrian Baal, and in a large number of compound divine names in Semitic inscriptions; the change from *Melech* to *Molech* is due to the later Jews, who gave the word in this connection the vowel-points of *Bosheth* ('shameful thing;' cf. Mephibaal, Mephibosheth). Of Moloch as a deity of the Ammonites nothing special is recorded, and it is not improbable that in 1 Kings, xi. 7, the only place where he is spoken of as such, the kindred word Milcom or Malcam ought to be read (see the LXX. and compare 1 Kings, xi. 5, 33; 2 Kings, xxiii. 13; Jer. xlix. 1, 3; Zeph. i. 5). In any case the worship of the Ammonite deity in the days of Solomon was essentially distinct from the Moloch worship which at a later date came to be practised in Judah, especially in times of great calamity. The first recorded instance of a worshipper of Jehovah 'making his son to pass through the fire to Moloch' is that of Ahaz (2 Kings, xvi. 3). The same story is told of Manasseh (2 Kings, xxi. 6), and that the practice had become a common one in the course of the 7th century is shown by frequent allusions in Jeremiah, Ezekiel, and the Book of Leviticus. The victims were slain at the sanctuary (Jer. xix. 4), and afterwards burned as holocausts on a 'tophet' or pyre in the valley of Hinnom (Ge-Hinnom, Gehenna) near Jerusalem (2 Kings, xxiii. 10; Jer. vii. 31, 32; xix. 6, 13, 14); the often quoted description by Rabbinical writers of a calf-headed brazen image of Moloch, in which the children were burned alive, is mere invention. On the general question of the origin of human sacrifice, see SACRIFICE. It is probable that the ritual of Moloch worship was borrowed by the people of Judah from one or other of the surrounding nations; it was practised, we know, by the Moabites (2 Kings, iii. 27). At Jerusalem it has been held that it was intended to propitiate Jehovah, regarded as the national 'Moloch' or 'Baal' or 'King,' though the prophets speaking in Jehovah's name constantly denounced it as unsanctioned by Him (see Jer. vii. 31; xix. 5). See Baudissin's monograph, *Jahve et Moloch* (1874).

Moloch (*Moloch horridus*), an exceedingly spiny Australian lizard, covered all over with horny warts and sharp spines, which give it a quaint if



Moloch horridus.

repulsive appearance, concealing, however, an inoffensive character. It is sluggish in its movements, attains a length of 10 inches, and is found chiefly in South and West Australia.

Mologa, a town in the Russian government of Jaroslav, near the confluence of the Mologa and Volga, 68 miles WNW. of Jaroslav. Pop. 6361.—The river Mologa winds 337 miles south-eastward through the governments of Tver, Novgorod, and Jaroslav, and is one of the links between the Volga and the Neva.

Molokai. See HAWAII.

Molossians, the most important people of ancient Epirus (q.v.).

Moltke, HELMUTH, COUNT VON, field-marshal of the German empire, who as chief of the general staff at Berlin planned the Prussian campaign of 1866 against Austria, and the German campaign of 1870–71 against France. He was born 26th October 1800, at Parchim in Mecklenburg-Schwerin, his father being a general in the Danish army, of a good old family and considerable wealth. In 1812 he was, with his only brother, sent to the military academy at Copenhagen, where he remained under the strictest discipline for six years, and distinguished himself in the scientific branches of military study. In 1819 he became lieutenant in a Danish regiment, but on the separation of Denmark from Norway he determined to retire from the Danish and enter the Prussian service. This change being effected, he passed the necessary examinations, and entered a Prussian regiment at Frankfort. His parents having by this time lost the whole of their property from war and misfortune, he had to undergo many hardships in order to maintain himself on the slender pay of a Prussian officer, and at the same time obtain instruction in various foreign languages. In 1832 Moltke was appointed to the staff, and for three years he continued to develop by scientific and exact study his extraordinary powers of combination and organisation. He then obtained leave to travel, and, arriving in Turkey at a critical moment, he was

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entrusted by the sultan with the task of remodelling the Turkish army, and remained with Mahmoud II. as military adviser till October 1839, when he returned to his old position at Berlin. From 1858 to 1888 he was chief of the general staff in Berlin, and he at once commenced the reorganisation of the Prussian army. He also elaborated plans for the defence of the German coasts, and the creation of a German navy. His wonderful strategical power was displayed in the wars with Denmark in 1863–64, with Austria in 1866, and with France in 1870–71, bringing them all to triumphant issues. He married in 1845 Mary Burt, the daughter of an English gentleman residing in Holstein, but has had no family, and his wife died in 1868. He is a man of great modesty and simplicity, and so reserved as to have gained the popular epithet of *The Silent*. His ninetieth birthday was the occasion of numerous honours at the hands of the emperor and the German people.

Moltke is the author of several important works, of which the first, *Letters from Turkey* and the *Campaign in Turkey*, were published in 1835, and the *Italian Campaign of 1859* in 1863. The *History of the German and French War of 1870–71*, published by the general staff in Berlin, was written entirely under his direction, and the greater part of it is actually from his pen. His *Letters from Russia*, written in 1856 to his wife, were published in 1877. An English version of these, by the present writer, was published in 1878 by Kegan Paul & Co., preceded by a sketch of his life. See also Lives by Wilhelm Müller (Eng. trans. Pinkerton, 1879), F. von Köppen (1888), and Müller-Bohn (1889).

Molucca Beans. See GUILANDINA.

Moluccas (also called SPICE ISLANDS), the easternmost division of the Malay Archipelago, comprising most of the islands between Celebes and New Guinea west and east, and between Timor and the Philippines south and north. Originally the term *Molucos* was applied by the Portuguese only to the small islands (Ternate, Tidor, &c.) west of Jilolo, which are now known as the *Little Moluccas;* but it was gradually extended to Jilolo itself, to Buru, Ceram, and all the spice-growing islands of the eastern seas, which, with parts of Celebes and New Guinea, now form politically the three Dutch residencies of *Ternate*, *Amboyna*, and *Banda*, and which physically fall into the two groups of the *Northern Moluccas*, disposed in the direction from north to south, and the *Southern Moluccas*, running mainly west and east. The northern group, which is surrounded on all sides by deep waters, ranging from 500 to 2000 fathoms, lies between the Molucca and Jilolo passages west and east, and comprises Morotai (Morty) and Rau (Riao) in the north, Jilolo, Ternate, Tidor, and other islets in the centre, Batchian (Batjan), Tawali, Mandioli, and Great and Little Obi (Oby) in the south, with a total area of nearly 10,000 sq. m., of which Jilolo has 7000, Morotai 1100, and Batchian 850. The population is vaguely estimated at 60,000, of which nearly half are concentrated in the small but politically important islands of Tidor and Ternate, with respective areas 35 and 25 sq. m.

The Southern Moluccas are connected by a submarine bed of less than 100 fathoms westwards with Sula and Celebes, but are separated from the northern group by an abyss of over 1500 fathoms, and are washed on the south side by the Banda Sea, which has a depth of 3000, and at one point (near the Banda volcano) of over 4000 fathoms. They comprise the two large islands of Buru (8500 sq. m.) and Ceram (7000), the small Amboyna, Uliasser, Banda, and Ceram Laut sub-groups, the outlying Ké (Kei) and Aru clusters, with some other islets scattered over the neighbouring waters, with a collective area of 16,500 sq. m., and an estimated population of 350,000, of which 200,000 are in Ceram, 60,000 in Buru, 30,000 in Amboyna, 26,000 in Uliasser, and 6000 in Banda. Thus the Moluccas, taken in the widest sense, have a total area of over 26,000 sq. m., and a population of probably not much more than 400,000, chiefly Orang-Malâyu, or civilised Malays, in the Little Moluccas, Banda, and Amboyna, elsewhere the so-called 'Alfuros'—i.e. uncivilised or non-Mohammedan natives, some Indonesians, some true Malays, some mixed Malayo-Papuans (see MALAYS).

The Moluccas lie partly on the line of the great volcanic fault, which sweeps round in a vast curve from Sumatra to the Philippines and Japan, and which in the Moluccas is indicated by the still active Gunong-Api (1870 feet) in Banda, Tidor (5730), Ternate (5650), Motir (2800), three cones in Jilolo, Tolo in Morotai. Api was the scene of a terrific eruption accompanied by earthquakes in 1825; Ternate is one of the most restless volcanoes in Malaysia; and several other cones appear to be of relatively recent date. For ages the whole region has evidently been subject to continuous convulsions, which have reduced it to its present fragmentary state. At a remote geological epoch it probably formed part of Celebes and the Philippines, a supposition by which are best explained the many features possessed in common by the natural history of these now scattered lands. The trachitic Morotai was certainly at one time connected with Jilolo, and were the connection restored the resemblance would be complete between the curiously shaped islands of Celebes and Jilolo, which have been compared to a mutilated starfish. Jilolo, also called Halmahera, or the 'Great Land,' largely consists, like Ceram and Buru, of crystalline or metamorphic and very old sedimentary (coralline limestone) rocks, whereas Ternate, Tidor, Banda, and the smaller members of the group are partly of igneous, partly of coralline origin.

Despite their tropical position, being nearly bisected by the equator, the Moluccas enjoy a relatively healthy climate, and in some places the European race (Portuguese and Dutch) has even been acclimatised. The excessive heats are everywhere tempered by sea-breezes and by the mountainous character of the islands, which in Buru and Ceram rise to heights of 8000 and even 10,000 feet. In the Southern Moluccas the north-east trades prevail from May to October, and are accompanied by heavy rains and thunderstorms. They are followed by the west monsoon, which has already discharged most of its moisture before reaching this region. In the north the regular winds become intermingled, with the result that the seasons are here extremely variable, fine and wet weather alternating throughout the year. But the temperature oscillates everywhere within very narrow ranges, seldom rising above 85° or falling below 75° F. on the coast-lands. Rainfall, 150 inches at Amboyna.

Indigenous to most parts of this region are the clove, nutmeg, and other spices, although these plants are now cultivated only in Amboyna and the Banda group; elsewhere they were extirpated by the Dutch government with the view of increasing the value of the Banda plantations, and preserving the monopoly of the spice trade. Other valuable plants are the sago-palm, which supplies the staple food of the Moluccas; the pandanus, remarkable for its aërial roots, the kanary nut, dammar pine, and Cajeput (q.v.).

In its fauna the Molucca group is connected with Celebes by the babiroussa hog found in Buru, and with New Guinea by the bird of paradise (Batchian), the marsupial cuscus and flying opossum occurring in several islands. Here are also found the cassowary, the Australasian megapodius, or mound-building bird, the crimson lory, the racket-

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tailed kingfisher, and numerous species of parrots and pigeons noted for their gorgeous plumage. Insects, such as the long-armed beetle of Amboyna and several butterflies, here attain their largest size and display their brightest colours. The shallow waters, especially of the southern group, are also noted for the vivid hues of the anemones, sponges, shells, and corals covering the bed of the sea, and for the immense number of their fishes.

Notwithstanding their small size, Ternate and Tidor have always been the chief centres of political power in the northern, and Amboyna in the southern Moluccas. These islands have long been occupied by civilised Malays, who easily asserted their supremacy over the surrounding lands, which are inhabited chiefly by rude wild tribes at a low stage of culture. Formerly the Mohammedan sultans of Tidor and Ternate were amongst the most powerful rulers in Malaysia, their dominions stretching westwards to Celebes and eastwards to New Guinea, and comprising all the intermediate islands. It was as heirs to these potentates that the Dutch claimed all the western part of New Guinea, as far as the 141st meridian. For the same reason the present Dutch residency of *Ternate* includes that part of East Celebes which is watered by the Gulf of Tomini, together with the adjacent islands. In Ternate is still centred most of the trade of the northern Moluccas, which export spices, tortoise-shell, trepang, beeswax, bark, and birds of paradise in considerable quantities. The residency of *Amboyna*, one of the oldest Dutch settlements in the East, comprises the whole of Buru, the western half of Ceram, and all the neighbouring islets. The town of Amboyna, capital of all the Dutch possessions in the Moluccas, carries on a flourishing export trade in cloves, of which half a million pounds have been raised in favourable years in the famous clove-gardens belonging to the government. *Banda*, the third Dutch residency, comprises, besides the Banda group (Great Banda, Api, Neira, and Pisang), a large part of Ceram, the Ké and Aru groups, Timor Laut, and the Serwati Archipelago. Banda is the true home of the nutmeg, which here grows naturally, and arrives at the greatest perfection on the slopes of all the volcanic islands, which are disposed round an inner basin like the fragments of some disruptured crater. Neira or Banda, called also Nassau, seat of the residency, occupies the southern extremity of Neira Island on the north side of the basin over against Gunung-Api. Besides the nutmeg and mace, Banda yields sago and cocoa-nuts for the export trade, which has long been monopolised by the so-called 'Perkeniers,' descendants of Europeans settled in this group since the beginning of the 17th century, and now perfectly acclimatised.

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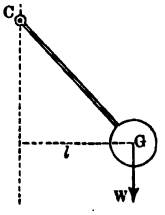
Molybde'num (sym. Mo; atomic weight, 96; sp. gr. 8·62) is a rare metal, which, in a state of purity, is of a silvery white colour, has a strongly metallic lustre, is brittle, and very difficult of fusion. It never occurs native, and its principal ore is the bisulphide, which much resembles graphite. It is also occasionally found oxidised, in molybdate of lead. The metal may be obtained by roasting the bisulphide in a free current of air, when the sulphur goes off oxidised as sulphurous acid, and the molybdenum is also oxidised into Molybdic Acid (MoO_3), and remains in the vessel. By the action of charcoal, the reduced metal is then obtained from the acid. Molybdenum forms three compounds with oxygen—the protoxide (MoO), the binoxide (MoO_2), and molybdic acid (MoO_3). Of these three the last alone has any practical value. Molybdic acid is a white, glistening, crystalline powder, which is sparingly soluble in water, fuses at a red heat to a straw-coloured glass, and unites with bases to form well-marked salts, the molybdates, which are either colourless or yellow. A solution of molybdate of ammonia is one of the most delicate tests for phosphoric acid. Molybdenum forms various compounds with sulphur, chlorine, &c., none of which are of any practical importance, except the native bisulphide.

Mombasa, or MOMBAZ, a seaport and the headquarters of the Imperial British East Africa Company's territories, stands on a small coralline island 3 miles long by 2½ broad close to the coast, in 4° 4′ S. lat., about 150 miles N. of Zanzibar. The shores of the island are rocky and abrupt, and the greater part of its surface is covered with dense bush. The town has the usual Arab characteristics of ruin and neglect. The only object of interest is an extensive fort, built in 1594 by the Portuguese, and restored by them in 1635. Mombasa was visited by Vasco da Gama in 1497; it was then a large and prosperous town (as it was when Ibn-Batúta was there in 1331), with a colony of Christians of St Thomas and Banyans from India. It was held by the Portuguese during the greater part of the period from 1505 to 1698, though not without frequent captures. The native chief put it under British protection in 1823; but, they soon abandoning it, it was seized by the sultan of Zanzibar, who in 1888 ceded it provisionally to the British East Africa Company. They were made definitive masters of the place two years later, when they also were put in possession of a vast tract of country, extending 400 miles along the coast, from the river Juba to the river Umba, and inland up to Victoria Nyanza, and beyond it to the frontiers of the Congo Free State—an area of probably 700,000 sq. m., more than six times the size of Great Britain and Ireland together. Gold, copper, plumbago, and iron ore, as well as india-rubber, exist in this region in considerable abundance. The company have connected Mombasa with Zanzibar by telegraph, and in 1890 commenced a railway inland to Victoria Nyanza, a distance of 400 miles. The harbour, one of the largest, safest, and healthiest on the east coast of Africa, was in 1890 made a British naval coaling station, and the headquarters of the fleet in that part of the world. There is a pier; and other harbour-works were begun in 1890. Pop. about 20,000, mostly Africans, with some Arabs and Banyans. On the mainland opposite is Frere Town, the see of the Anglican bishop of East Equitorial Africa.

Moment of a dynamical quantity is the importance of that quantity in regard to its dynamical effect relatively to a given point or axis. The most familiar example is the Moment of a Force. For simplicity, take a body movable about a fixed axis—say, a door on its hinges. Everyday experience teaches us that such a door is most easily moved by a push or pull applied as far as possible from the hinge. In moving the door slowly through a certain angle, we must do so much work in, first, causing the necessary acceleration, and then in overcoming the friction of the hinges. If we apply the force at a greater distance from the hinge, it works through a proportionally greater arc, and is therefore proportionately less. Such considerations lead to the definition of the moment of a force about a point as the product of its amount into its perpendicular distance from the point. The



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tendency of the action of such a force is to cause rotation about an axis perpendicular to the plane passing through the point and containing the force. Thus, in the case of a pendulum, the effectiveness of the force in causing rotation is measured by the moment Wl—where W is the weight of the pendulum, and l is the distance of the line of action of the force W from the centre of rotation C, or (what comes to the same thing) the distance of the centre of mass G from the vertical line through C.

The term moment enters into several other phrases, all of which relate either directly or indirectly to rotation. Thus, there is the moment of momentum, or angular momentum, whose rate of change is the measure of the moment of the force producing the change. To obtain it for any given body rotating with angular speed ω about an axis, we first imagine the body broken up into a great many small portions of masses m_1, m_2, m_3, &c. at distances r_1, r_2, r_3, &c. from the axis, multiply the momentum ($mr\omega$) of each mass by its distance, and then take the sum of all these products. The angular speed ω being the same in every expression, the moment of momentum takes the form $\omega\,(m_1r^2_1 + m_2r^2_2 +$ &c.), which it is usual to write in the symbolic form $\omega\Sigma mr^2$. The quantity Σmr^2, which is the sum of the products of each mass into the square of its distance from the axis, is called the Moment of Inertia about that axis. It is the factor in the moment of momentum, which depends upon the distribution of matter in the body. It enters into all questions of mechanics in which rotation is involved, from the spinning of a top or the action of an engine governor to the stability of a ship. By an obvious extension, the word moment is also used in such combinations as moment of a velocity and moment of an acceleration. Such phrases correspond to nothing truly dynamic, unless we regard velocity as meaning the momentum of unit mass, and acceleration as the rate of change of that momentum. See DYNAMICS, FORCE, INERTIA, ROTATION, &c.

MOMENTUM is our modern equivalent of Newton's quantity of motion (*quantitas motus*), which in Definition II. of the *Principia* is stated to be measured by the product of the velocity and the mass. Its dynamic importance is sufficiently discussed under FORCE.

Momien, a Chinese frontier-town in the extreme west of Yunnan, 135 miles NE. of Bhamo. See Anderson's *Mandalay to Momien* (1876).

Mommsen, THEODOR, the most learned historian of Rome, was born the son of a pastor at Garding, in Sleswick, 30th November 1817. He studied at Kiel, next spent three years traversing France and Italy in the study of Roman inscriptions under commission of the Berlin Academy, edited awhile the *Schleswig-Holsteinische Zeitung*, and in the autumn of 1848 was appointed to a chair of Jurisprudence at Leipzig, of which two years later he was deprived for the part he took in politics. In 1852 he was appointed to the chair of Roman Law at Zurich, in 1854 at Breslau, and in 1858 to that of Ancient History at Berlin. Here he was engaged for many years in editing the monumental *Corpus Inscriptionum Latinarum*, projected by the Berlin Academy, and commenced in 1863; and in 1873 he was elected perpetual secretary of the Academy. In 1882 he was tried for slandering Bismarck in an election speech, but was cleared both in the lower court and in that of appeal. His fine library was burned in 1880, whereupon a number of English students presented him with a collection of books to make good at least part of his loss. Mommsen took a share in the work of editing the *Monumenta Germaniæ Historica*, and has made his name illustrious by a series of works of vast range and profound erudition. His greatest work remains his *Römische Geschichte*, brought to the battle of Thapsus (3 vols. 1854–56; 8th ed. 1889; Eng. trans. by W. P. Dickson, 4 vols. 1862–67). These three volumes form books i.–v. of Mommsen's plan; vol. v., forming book viii., was issued in 1885 (Eng. trans. by Dickson, *The Provinces of the Roman Empire from Cæsar to Diocletian*, 2 vols. 1886). Freeman characterises Mommsen as 'the greatest scholar of our times, well-nigh the greatest scholar of all times . . . language, law, mythology, customs, antiquities, coins, inscriptions, every source of knowledge of every kind—he is master of them all.' But, while admitting readily his wide and sure grasp of historical sequence, the reader finds Mommsen defective in political and moral insight, and prone to fall down in worship before mere force and success.

Other important works of Mommsen's are *Oskische Studien* (1845); *Die Unteritalischen Dialekte* (1850); *Corpus Inscriptionum Neapolitanarum* (1851); his monographs on *Roman Coins* (1850); the edict of Diocletian, *De Pretiis Rerum Venalium* (1851); *Die Rechtsfrage zwischen Cäsar und dem Senat* (1857); *Römische Forschungen* (1864–79); *Res Gestæ Divi Augusti* (1865); *Römisches Staatsrecht* (1871–76; 3d ed. 1887); and his *Digesta Justiniani Augusti* (1866–70).

Of his brothers, two have achieved distinction: TYCHO, born at Garding, 23d May 1819, studied at Kiel, traversed Italy and Greece, and held educational appointments at Eisenach, Oldenburg, and Frankfort-on-Main until his retirement in 1885. He devoted many years to studies upon Pindar, producing a great critical edition in 1864 (an edition of the text in 1866), *Scholia* (1861), a translation (1846), and *Parerga Pindarica* (1877).

AUGUST, born at Oldesloe, 25th July 1821, studied at Kiel, and taught in schools at Hamburg, Parchim, and Sleswick. Most of his works belong to the field of Greek and Roman chronology. Among them are *Römische Daten* (1855), *Beiträge zur Griechischen Zeitrechnung* (1856–59), *Griechische Jahreszeiten* (1873), *Delphika* (1878), and *Chronologie Untersuchungen über das Kalenderwesen der Griechen* (1883).

Mompox, or MOMPOS, a town of Bolivar in Colombia, on the Magdalena, 110 miles SE. of Cartagena. Founded in 1538, it contains a good secondary school and a distillery. Pop. 8000.

Monachism, or MONASTICISM (Gr. *monachos*, 'a monk,' from *monos*, 'alone'), may in general be described as a state of religious retirement, more or less complete, accompanied by contemplation, and by various devotional, ascetical, and penitential practices. It is, in truth, Asceticism (q.v.), with the element of religious solitude superadded. The institution of monachism has, under different forms, entered into several religious systems, ancient and modern. That it was known among the Jews before the coming of our Lord appears from the example of the prophet Elijah and from that of the Essenes; and it is probable that religious seclusion formed part of the practice of the Nazarites, at least in the later periods of Jewish history. In the Brahmanical religion it has had a prominent place; and even to the present day the *lamaseries* of Tibet may be said to rival in number and extent the former monasteries of Italy or Spain. The Christian advocates of monachism find in the exhortations to voluntary poverty (Matt. xix. 21) and to celibacy (1 Cor. vii. 37) at once the justification and the origin of the primitive institution. Its first form appears in the practice of asceticism, of which we find frequent mention in the early part of the 2d century.

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The primitive ascetics, however, lived among the brethren, and it is only in the following century that the peculiar characteristic of monachism begins to appear. The earliest form of Christian monachism is also the most complete—that of the Anchorites or Hermits (q.v.)—and is commonly believed to have in part originated in the persecutions, from which Christians were forced to retire into deserts and solitary places. The hermits maintained from choice, after the cessation of the persecutions, the seclusion to which they had originally resorted as an expedient of security; and a later development of the same principle is found in the still more remarkable psychological phenomenon of the celebrated 'Pillar-saints' or Stylites (q.v.). After a time, however, the necessities of the religious life itself—as the attendance at public worship, the participation in the sacraments, the desire for mutual instruction and edification—led to modifications of the degree and of the nature of the solitude. First came the simplest form of common life, which sought to combine the personal seclusion of individuals with the common exercise of all the public duties; an aggregation of separate cells into the same district, called by the name *Laura*, with a common church, in which all assembled for prayer and public worship. From the union of the common life with personal solitude is derived the name *cœnobite* (Gr. *koinos bios*, common life), by which this class of monks is distinguished from the strict solitaries, as the hermits, and in which is involved, in addition to the obligations of poverty and chastity which were vowed by the hermits, a third obligation of obedience to a superior, which, in conjunction with the two former, has ever since been held to constitute the essence of the religious or monastic life. The first origin of the strictly cœnobitical or monastic life has been detailed under the name of St Antony (q.v.), who may be regarded as its founder in the East, either by himself or by his disciples. So rapid was its progress that his first disciple, Pachomius, lived to find himself the superior of 7000. In the single district of Nitria, the country of the Natron Lakes (q.v.) in the Egyptian delta, there were, according to Sozomen, no fewer than fifty monasteries, and before long the civil authorities judged it expedient to place restrictions on their excessive multiplication. It seems to be admitted that in the East, where asceticism has always been held in high estimation, the example of Christian monasticism had a powerful influence in forwarding the progress of Christianity; although it is also certain that the admiration which it excited occasionally led to its natural consequence among the members, by eliciting a spirit of pride and ostentation, and by provoking sometimes to fanatical excesses of austerity, sometimes to hypocritical simulations of rigour. The abuses which arose, even in the early stages of monachism, are deplored by the very Fathers who are most eloquent in their praises of the institution itself. These abuses prevailed chiefly in a class of monks called *Sarabaitæ*, who lived in small communities of three or four, and sometimes led a wandering and irregular life. On the other hand, a most extraordinary picture is drawn by Theodoret of the rigour and mortification practised in some of the greater monasteries. The monks were commonly zealots in religion; and much of the bitterness of the religious controversies of the East was due to that unrestrained zeal; and it may be added that the opinions which led to these controversies originated for the most part among the theologians of the cloisters. An order was called *Acœmetæ* (Gr., 'sleepless'), from their maintaining the public services of the church day and night without interruption (see GREEK CHURCH).

It was in the cœnobitic rather than the eremitic form that monachism was first introduced into the West, at Rome and in Northern Italy by Athanasius, in Africa by St Augustine, and afterwards in Gaul by St Martin of Tours. Here also the institution spread rapidly under the same general forms in which it is found in the Eastern Church; but considerable relaxations were gradually introduced, and it was not until the thorough reformation and, as it may be called, religious revival effected by the celebrated St Benedict (q.v.), in the beginning of the 6th century, that western monachism assumed its peculiar and permanent form. In some of the more isolated churches, as, for instance that of Britain, it would seem that the reformations of St Benedict were not introduced until a late period; and in that church, as well as in the church of Ireland, they were a subject of considerable controversy. One of the most important modifications of monachism in the West regarded the nature of the occupation in which the monks were to be engaged during the times not directly devoted to prayer, meditation, or other spiritual exercises. In the East manual labour formed the chief, if not the sole external occupation prescribed to the monks; it being held as a fundamental principle that for each individual the main business of life was the sanctification of his own soul. In the West, besides the labour of the hands, mental occupation was also prescribed—not, it is true, for all, but for those for whom it was especially calculated. From an early period, therefore, the monasteries of the West, and particularly those of Ireland or those founded by Irish monks (see COLUMBA, CULDEES), as Iona and Lindisfarne, became schools of learning, and training-houses for the clergy. At a later period most monasteries possessed a *scriptorium*, or writing-room, in which the monks were employed in the transcription of MSS.; and, although a great proportion of the work so done was, as might naturally be expected, in the department of sacred learning, yet it cannot be doubted that it is to the scholars of the cloister we owe the preservation of most of the masterpieces of classic literature which have reached our age.

In the remarkable religious movement which characterised the church of the 12th century (see FRANCISCANS) the principle of monachism underwent a further modification. The *spiritual egoism*, so to speak, of the early monachism, which in some sense limited the work of the cloister to the sanctification of the individual, gave place to the more comprehensive range of spiritual duty, that, in the institute of the various bodies of Friars (q.v.) which that age produced, made the spiritual and even the temporal necessities of one's neighbour, equally with, if not more than, one's own, the object of the work of the cloister. The progress of these various bodies, both in the 12th century and since that age, is detailed under their several titles. The monastic institutes of the West are almost all offshoots or modifications of the Benedictines (q.v.); of these the most remarkable are the Carthusians, Cistercians, Clugniacs, Premonstratensians, and, above all, Maurists. In more modern times other institutes have been founded for the service of the sick, for the education of the poor, and other similar works of mercy, whose members are also classed under the denomination of monks. The most important of these are described under their several heads.

The enclosure within which a community of monks reside is called a Monastery (q.v.), and sometimes convent. By the strict law of the church, called the law of cloister or enclosure, it is forbidden to all except members of the order to enter a monastery; and in almost all the orders this prohibition is rigidly enforced as regards the admission of

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females to the monasteries of men. To such a length is this carried in the Greek Church that in the celebrated enclosure of Mount Athos not only women, but all animals of the female sex are rigorously excluded. The first condition of admission to a monastic order is the approval of the superior, after which the candidates remain for a short time as *postulants*. After this preliminary trial, they enter on what is called the *novitiate*, the length of which in different orders varies from one to three years; and at its close they are admitted to the profession, at which the solemn vows are taken. The age for profession has varied at different times and in different orders; the Council of Trent, however, has fixed sixteen as the minimum age. Originally all monks were laymen; but after a time the superiors, and by degrees other more meritorious members, were admitted to holy orders. Amongst the mendicants, those in priest's orders were called 'father,' the lay brothers 'brother' only. In either case, where the order is one of those solemnly approved by the church, the engagement taken at the final profession is life-long and irrevocable.

The name monastery, in its most strict acceptation, is confined to the residences of monks, properly so called, or of nuns of the cognate orders (as the Benedictine), and as such it comprises two great classes, the *Abbey* and the *Priory*. The former name was given only to establishments of the highest rank, governed by an abbot, who was commonly assisted by a prior, sub-prior, and other minor functionaries (see ABBOT). A Priory supposed a less extensive and less numerous community. It was governed by a prior, and was originally, although by no means uniformly (at least in later times), subject to the jurisdiction of an abbey. The distinction of abbey and priory is found equally among the Benedictine nuns. In the military orders the name of Commandery and Preceptory corresponded with those of abbey and priory in the monastic orders. The establishments of the mendicant and, in general, of the modern orders are sometimes, though less properly, called monasteries. Their more characteristic appellation is Friary or Convent, and they are commonly distinguished into Professed Houses (called also Residences), Novitiates, and Colleges or Scholastic Houses. The names of the superiors of such houses differ in the different orders. The common name is Rector, but in some orders the superior is called Guardian (as in the Franciscan), or Master, Major, Father Superior, &c. The houses of females —except in the Benedictine or Cistercian orders— are called indifferently *Convent* and *Nunnery*; their head is styled Mother Superior or Reverend Mother. The monastic institute, from the very earliest time, included women as well as men. The former were called in Greek by the name *nonis* or *nonna*, and in Latin *nonna* (from which the English *Nun*), as also *sanctimonialis*. The general characteristics of the monastic institute for females are substantially identical with those of the male orders.

It was to be expected that the monastic foundations in England would not long survive the national rejection of the papal power which was their main support. The monasteries had mostly outlived their days of usefulness, and very inadequately fulfilled the objects of their institution. A general, though not universal decay of religious fervour, and the revelation from time to time of grave scandals within their walls disposed many prudent men to regard them with little favour. But the immediate cause of their downfall was their accumulated wealth with which Cromwell tempted the covetousness of Henry VIII. The dissolution of monasteries was indeed no new idea, for Cardinal Wolsey several years before had obtained bulls from the pope enabling him to suppress certain religious houses and appropriate their funds for other purposes. Henry's proceedings were, however, as unworthy as his motives. He appointed unprincipled agents to visit and report upon the state of all the religious houses in the kingdom. These men performed their work in indecent haste, and upon obviously insufficient evidence brought against the monks generally charges of gross immorality which were embodied in the so-called Black Book, now lost. The king at first acted with considerable craft. He appealed to the selfishness of the greater abbots who had seats in the House of Lords, and silenced their opposition by declaring that in the larger monasteries 'religion was right well kept,' and proposed the confiscation only of the smaller houses (376 in number) with a revenue of less than £200 a year. This ensured the passing of the Act of Suppression in February 1536. But the turn of the 645 greater monasteries soon came. Certain abbots implicated in the rising of the 'Pilgrimage of Grace' were convicted of treason and their houses seized. Then followed another general visitation, and, by bribes, intimidation, and violence, the remaining monastic communities were one by one induced in 1539 to 'surrender' their property to the king. The revenue accruing to the crown by the confiscation is estimated at over £130,000. With this fund six new episcopal sees and certain collegiate churches and grammar-schools were founded, and a few castles built for the defence of the coast. But the greater part of the property fell through purchase or gift into the hands of the nobility and gentry; and the policy which thus interested powerful laymen in maintaining the new order of things effectually barred the way to the restoration of monasticism in the reactionary reign of Mary. Fresh light has been thrown upon this whole subject by Canon Dixon in his recent *History of the Church of England*, and again more fully by Father Gasquet, O.S.B., in *Henry VIII. and the English Monasteries* (2 vols. 1889; 4th ed. 1890).

In some of the German states the temporalities of the suppressed monasteries were retained at the Reformation, and were granted at pleasure by the sovereign, to be enjoyed together with the titular dignity. Some of the German churches, however, in later times, have revived the institution, especially for women (see DEACONESSES). In England there was the religious community of Little Gidding (1625–47), founded by Nicholas Ferrar (q.v.); and in 1865 a sort of Anglican mission order, the Cowley Fathers, was established at Oxford; but here, too, Sisterhoods (q.v.) are far more numerous. In all these Protestant revivals of monachism, the engagement is revocable at the will of the individual. At the French Revolution the monastic establishments of France were utterly suppressed; and in most of the other Catholic countries of Europe the example has been followed to a greater or less extent. After the Restoration a revival of many of the orders took place in France. In 1835 Spain suppressed 900 monasteries, and the rest soon thereafter; Portugal dissolved all its religious houses in 1834. In Belgium, Austria, and Switzerland, monasteries are numerous—in Belgium there are 200 communities, in Austria (without Hungary) 450, in Switzerland 88. In Italy, Sardinia put an end to the monasteries in 1866, and the same measure was extended to the whole kingdom after 1870, the orders being expropriated, and their houses made national property; in all upwards of 2200 houses were suppressed. In 1875 Prussia dissolved all orders save those devoted to sick-nursing (at that date there were in all Germany 2588 monks and 16,846 nuns), but in 1887 readmitted all those orders engaged in pastoral duty, Christian charity, or the contemplative life. The French decree of 1880,

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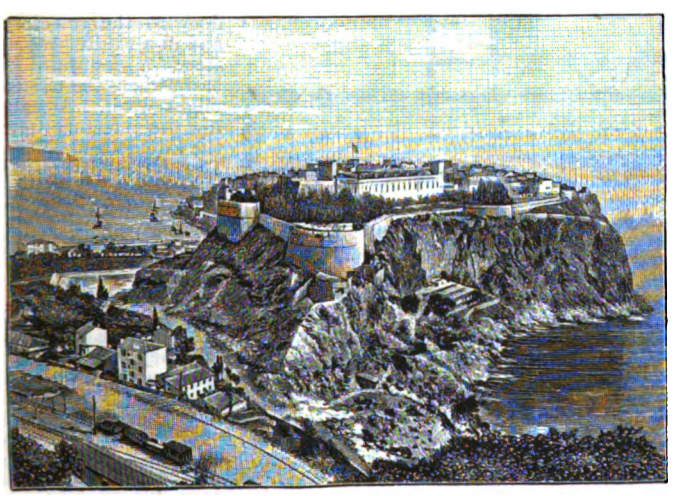
breaking up 'unauthorised orders,' dealt with 384 houses with 7444 monks, and 602 houses with 14,003 nuns, there were in all at that date some 25,000 monks and nuns in France. In England and Ireland and America, on the contrary, and largely as a consequence, monastic institutions have made rapid progress of late years. Most of the orders introduced are active, not contemplative. In the United States some fifty orders are represented.

The following list gives the name and date of foundation of the chief orders; reference is made to the articles on them throughout this work, and to works cited there; as also to other articles quoted above, to ROMAN CATHOLIC CHURCH, CONGREGATION, &c.; and to Helyot, *Histoire des Ordres Religieux* (8 vols. 1714–21; new ed. 1860); Dugdale, *Monasticon Anglicanum* (new ed. 1817–30); Tanner, *Notitia Monastica* (1744); Möhler, *Geschichte des Mönchthums* (1836); Hill, *English Monasticism* (1867); Milman, *History of Latin Christianity* (1854); Montalembert, *Monks of the West* (Eng. trans. 1861–79); Harnack, *Das Mönchthum: seine Ideale und seine Geschichte* (1882); and *Handbook to the Convents and Religious Houses in the United Kingdom* (1885).

	A.D.		A.D.
Basilians (see BASIL)	363	Hieronymites	1374
Benedictines	529	Brethren of Common Life	1376
Monks of Iona (q.v.)	563	Bernardins	1425
Canons Regular	763	Oblate Nuns	1433
Clugniacs	910	Minims	1435
Austin Canons	1067	Barnabites	1484
Carthusians	1084	Theatines	1524
Cistercians	1098	Capuchins	1525
Hospitallers	1104	Recollets	1532
Templars	1118	Jesuits	1534
Premonstratensians	1120	Ursulines	1537
Trappists	1140	Oratorians	1575
Gilbertines	1148	Feuillants	1577
Beguines	1180	Oblate Fathers	1578
Teutonic Knights	1191	Jacobins	1608
Trinitarians	1197	Maurists	1621
Poor Clares (see CLARE)	1202	Lazarists	1624
Franciscans	1208	Sisters of Charity	1629
Carmelites	1209	Passionists	1725
Dominicans	1215	Redemptorists	1732
Celestines	1271	Ladies of the Sacred Heart	1800
Olivetans	1313	Marist Fathers	1813
Brigittines	1363	Sisters of Mercy	1827
Observantine Franciscans	1368	Little Sisters of the Poor	1840

Mon'aco, a small principality on the Mediterranean, 149 miles ENE. of Marseilles, and 9 from Nice. Area, 8 sq. m.; pop. (1873) 5741; (1888) 13,304, of whom 3292 were in the town of Monaco,



Monaco.

6218 in Condamine, and 3794 in Monte Carlo. The territory, which is encircled by the French department of Alpes Maritimes and the sea, consists mainly of the rocky promontory on which the capital is built, and a small strip of coast. For more than nine hundred years it has belonged to the family of Grimaldi. Originally of Genoese extraction, they first held lands in France, between Fréjus and Toulon, where the name of the bay of Grimaud still commemorates their sway. They acquired Monaco in 968, Mentone and Roquebrune and Castillon about 1230, and Antibes in 1237. In European politics they sided with the Guelph party. Honoré II. put his country under a French protectorate in 1644. In 1715 the heiress of the Grimaldi of Monaco married Matignon, Comte de Thorigny, and her descendants continued to reign over their small kingdom. It has, however, suffered at the hands of its great neighbours. In 1846 Mentone and Roquebrune were annexed by Sardinia, and after the war of 1859 the whole territory belonged for a short time to King Victor Emmanuel. The protests of its lawful owner were loud, but he was none the less ready for another arrangement, since in 1861 he sold Mentone and Roquebrune to Napoleon III. for 4,000,000 francs. His capital Monaco is now under French protection. Prince Albert (born in 1848, succeeded 1889), the present sovereign, has one son, Louis, by a marriage, dissolved in 1880, with Lady Mary Hamilton. About 1000 of the inhabitants are employed in the rooms and gardens of the celebrated Casino. These gambling-rooms, built at Monte Carlo on ground leased from the Prince of Monaco, belong to a joint-stock company, and have about 400,000 visitors. The climate of Monaco is milder than that of any other place in the Riviera; palms and aloes grow most luxuriantly, and rare wild-flowers are found on its rocky promontory. See Métivier, *Monaco et ses Princes* (2d ed. 1865); and Boyer de Sainte-Suzanne, *La Principauté de Monaco* (1884).

Monad (Gr. *monas*, 'unity'), in Philosophy, is one of the simple elements of which, according to the system of Leibnitz (q.v.), the universe is built up. In Biology the name is applied to a large number of minute and relatively simple flagellate Infusorians (q.v.).

Monaghan, an inland county of Ulster, Ireland, situated between Tyrone on the N. and Meath (in Leinster) on the S. Its greatest length from north to south is 37 miles; the total area being 319,741 acres (496 sq. m.), of which about 140,000 are under tillage. The population, which in 1841 was 200,442, had fallen in 1881 to 102,748 (of whom 73 per cent. were Catholic). The general surface is undulatory; the highest point is 1254 feet above the sea. It is interspersed with lakes of small extent, and has many small streams. In its geological structure the level country belongs to the great central limestone district; see IRELAND (geology); limestone, freestone, and slates are worked. The flax crop has greatly increased of late years, and the linen manufacture is thriving. The principal towns of this county are Monaghan, Carrickmacross, Clones, and Castle-Blayney. It returns two members to parliament. Monaghan, granted by Henry II. to De Courcey, speedily fell back into the hands of the native chiefs of the sept MacMahon, by whom (with some alternations of re-conquest) it was held till the reign of Elizabeth, when it was erected into a shire. The county possesses two round towers, one, very complete, at Clones, the other at Inniskeen; and there are several raths and Danish forts. The name Monaghan is derived from

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the Irish *Muinechan*, 'Monkstown,' a monastery having stood here at a very early date.

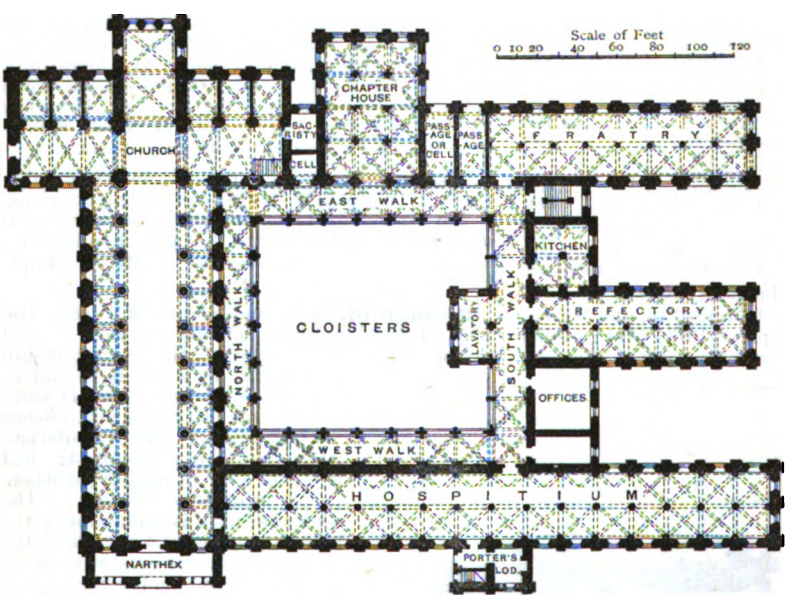
MONAGHAN, the county town, is 76 miles NNW. of Dublin by rail. The town, which returned two members to the Irish parliament, is still the centre of some trade in agricultural produce, and can boast several public buildings of considerable pretensions, among which are the Catholic college and church, the infirmary, and national model school. Pop. (1861) 3910; (1881) 3369. See Evelyn P. Shirley's *History of the County of Monaghan* (1877–80).

Monaldeschi. See CHRISTINA.

Monarchy (Gr. *monarchia*, from *monos*, 'alone,' and *archō*, 'I govern;' literally, the government of a single individual) is that form of government in a community by which one person exercises the sovereign authority; see GOVERNMENT. For Monarchianism, see UNITARIANISM.

Monastery, a class of structures which arose in the middle ages to meet the requirements of the large number of monks that then existed. It is proved by documents that these buildings were at first constructed somewhat after the plan of a Roman house, or rather of a Roman villa or country-house. Records of abbeys as early as the 7th century show that the arrangements were similar then to those of the 12th century. The cloister, which formed the inner court appropriated to the monks, resembles the peristyle of the Roman mansion. The latter was the part of the dwelling communicating with the private apartments of the family, just as the cloister communicated with the refectory, dormitory, and other apartments used by the monks and not entered by the public. There was also in the monasteries, as in the Roman villas, an outer courtyard, in which were situated the various stores, granaries, workshops, and other places required in connection with both these edifices.

There was, however, one entirely new element in the monastery—viz. the church. This was the largest and most important building, and regulated the position of all the rest. The conventual buildings of every abbey in Britain, France, and Germany are so much destroyed that a complete plan cannot be obtained. The annexed plan is a model one made by Mr E. Sharpe, and contains the results of his careful investigation of the Cistercian monasteries throughout Europe (see *Trans. Roy. Inst. of British Architects*, 1871). In northern climates the cloister was usually situated on the south side of the church, for the sake of the sunshine and warmth. It was composed of an open courtyard, square or oblong in shape, surrounded by an open arcade, or covered way. The church formed the north side, and on the east side was situated the chapter-house, with the monks' dormitory over it. The latter was thus in immediate communication with the church, and conveniently placed for the monks' attendance at the services during the night. The chapter-house in the Cistercian monasteries was usually divided into three compartments by the pillars bearing the arches. The abbot's seat was opposite the entrance door, and a stone seat all round accommodated the monks. The doorway was not closed, and together with an open arch or window on each side of it allowed those in the cloister to hear the discussions in the interior. The sacristy is placed on the north side of the chapter-house, with a door from the church. A similar cell or 'parlour' occupies the south side; then comes a passage or 'slype' leading from the cloister to the gardens, &c. Beyond this is the fratry or day-room of the monks, a long vaulted apartment running southwards, having a row of columns in the centre and *open* windows.



Cistercian Abbey—Model Plan.

The south side of the cloisters generally gave access to the refectory, a large, rather ornamental chamber, usually with an open wooden roof. It was sometimes placed parallel and sometimes at right angles to the cloister. Opposite the door to the refectory and in a vaulted recess stood a fountain or basin where the monks might wash. Adjoining the refectory were the kitchen and offices. The former was frequently a detached building with a large number of hearths, each having a separate chimney in the roof. Along the west side of the cloister, and sometimes extending much farther, lay the hospitium or guest-house, where all travellers were received, and the lay-room above, where they were lodged. A very important room in the monastery was the scriptorium or library, in which the MSS. were written and illuminated; this was situated on the second floor of the chapter-house. The abbot's lodge formed a separate edifice, as also did the infirmary. The whole establishment was surrounded by a wall, and provided with proper gates and defences. The outer gate gave access to the outer court, in which were situated the workshops of the various tradesmen connected with the abbey, and the buildings required in connection with the agricultural employments of the lay brethren.

Such were the arrangements of the Cistercian

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abbey in the 12th and 13th centuries. In later times the simplicity of the plan was broken in upon. The monks, desirous of more comfortable quarters, divided the dormitory and made it into cells. The open windows were glazed, and even the arches of the cloisters were sometimes enclosed. The early simplicity of the architectural style was also departed from, and the monastic buildings of the 15th century are as rich in decoration as the cathedrals and parish churches. The arrangements of the monasteries of the other orders were, generally speaking, similar to those of the Cistercian, except in the case of the Carthusians. In their convents, where absolute solitude and silence were required, each monk had a small house and garden to himself. These were arranged round the cloister, which, when the number of monks was large, were greatly extended in dimensions.

See Viollet le Duc, *Dictionnaire* and *Architecture Monastique;* De Caumont, *Abécédaire d'Archéologie;* Dugdale, *Monasticon;* and Mackenzie Walcot's works on the English and Scottish Churches. For Monasticism, see MONACHISM.

Monastir, called also BITOLIA, the second town in Turkish Macedonia, is situated in a broad mountain-valley, 90 miles NW. of Salonica. It manufactures carpets and silver filigree, and trades in corn and agricultural products. The Turks, recognising its strategic importance, have made it the headquarters of an army corps. Under its ancient name of Pelagonia it gives title to a Greek archbishop. Here the Albanian beys were massacred in 1833. Pop. 45,000.

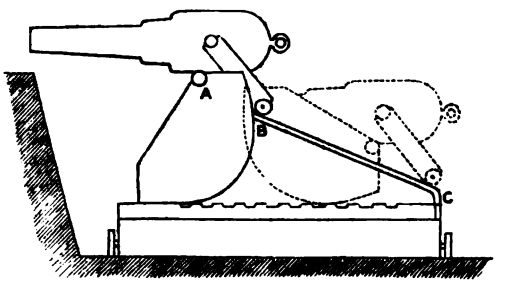
Monboddo, JAMES BURNETT, LORD, Scottish lawyer and author, was born at Monboddo House, in Fordoun parish, Kincardineshire, in 1714, and was educated at Marischal College, Aberdeen, and Edinburgh University, afterwards studying law for three years at Gröningen, in Holland. In 1737 he was called to the Scottish bar, and soon obtained considerable practice; but the first thing that brought him prominently into notice was his connection with the celebrated Douglas case, in which he acted as counsel for Mr Douglas. In 1764 he became sheriff of Kincardineshire, and in 1767 was raised to the bench by the title of Lord Monboddo. He died in Edinburgh, 26th May 1799. Monboddo's *Origin and Progress of Language* (6 vols. 1773–92) is a very learned, heretical, and eccentric production; yet in the midst of its grotesque crotchets there occasionally flashes out a wonderfully acute observation, that makes one regret the distorted and misapplied talent of the author. Its evolution theory—of monkeys that wore off their tails by constant sitting—seems less laughable now than it did to Monboddo's contemporaries; and in his study of man as one of the animals, and of civilisation by the light of savagery, he certainly anticipated the modern science of anthropology. Monboddo published, also anonymously, another work, *Ancient Metaphysics* (6 vols. 1779–99).

Monbuttu, a Negro stock in the basin of the Upper Nile and the Upper Welle. See AFRICA.

Moncalieri, a town of Italy, on the Po, 5 miles S. of Turin, with a royal palace (1470). Pop. 3463.

Moncontour, a village in the French department of Vienne, situated 48 miles SW. of Tours, was the scene of the defeat of the Huguenots under Coligny by the troops of the king of France, 3d October 1569.

Moncrieff Pits (named after the inventor, Sir Colin Scott Moncrieff) are excavations in which heavy guns are placed in coast batteries or other places where it is specially necessary to protect them from hostile artillery fire. The Moncrieff system of mounting utilises the force of recoil to bring the gun down into the loading position at the bottom of the pit. It is returned into the firing position (shown in the figure) either, as in the early patterns, by means of a heavy counterweight in front of the breast of the gun-carriage, or, as in later designs, by hydro-pneumatic machinery. When the counterweight is used, the side brackets of the carriage on which the disappearing movement takes place are made on a specially designed curve, so that this movement may be regular and without any violent shock. The figure represents a diagrammatic section of this arrangement. A is the rotating side bracket



revolving on teeth; BC are two inclined planes keeping the gun horizontal as it descends into the position shown by dotted lines. The same result is obtained in the hydro-pneumatic system of mounting by means of recoil presses, which also store up the force of the recoil and enable it to be used to elevate the gun into the firing position. The invention belongs to the years 1868–72.

Moncton, a town and port of entry of New Brunswick, on the Petitcodiac River, 89 miles by rail NE. of St John. It has important railway-shops, a large sugar-refinery, a cotton-factory, &c. Pop. 7500.

Mon'dovi, a cathedral city of Italy, 58 miles S. of Turin by rail. Pop. 10,302. Here, on 22d April 1796, the Sardinians were totally defeated by Napoleon.

Mone'ra, a class of Protozoa (q.v.) proposed by Haeckel to include the very lowest organisms supposed to be destitute of a nucleus. As this structure has been shown to exist in forms where it was formerly denied, the title is now being abandoned. See PROTOZOA.

Money. The term money is used, both in matters of business and in economic theories, in such very different ways that it is impossible to cover them all with a simple definition. Standard coins, bars of bullion which can at once be converted into standard coins, token coins, convertible bank-notes, inconvertible notes, are all included under 'money,' although they present essential differences. In modern societies one of the most important forms of money is 'bank money,' or the money of the money-market, which for the most part consists of neither coin nor notes. The whole of the banking system of the United Kingdom, for example, as well explained in Bagehot's *Lombard Street*, really rests upon the reserve kept by the Bank of England, and every bank receives deposits of 'money,' and makes advances of 'money,' with the use of a very small proportion of coins or bank-notes. A brief survey of the development of the complex monetary system of modern societies from its rudimentary forms will give the best explanation of this uncertainty in the meaning of this familiar word, and also bring out in the clearest way the principal functions of 'money.'

Exchanges first take place by means of barter, but the difficulties of simple barter are obviously very

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great. A coincidence of mutual wants at the same time and place is the first condition of any exchange, and it is plain that a common *medium of exchange* will obviate one of the principal difficulties of direct barter. If there is some one thing which every one is willing to take, it follows that anything else can be bought or sold against this particular commodity. Accordingly the first function of 'money' is to provide (1) a *medium of exchange*, and its first forms consist of things which are generally desired in simple states of society. Skins, cattle, shells, corn, pieces of cloth, mats, salt, and many other commodities have at different times and places been used as 'money,' in the sense of a common medium of exchange. The commodity chosen, however, will be of little advantage unless it can be used both in large and small quantities. This consideration leads to another primary function of money—viz. (2) as a *measure of value*. Not only is it necessary that things can be exchanged against a common substance, but the rates of exchange must be measured. Finally, as society advances, a basis for (3) *deferred payments*, and also a method of (4) *storing 'values'* without deterioration, become of importance. In order that these four primary functions may be fulfilled, the substance chosen for money must have certain properties, of which the principal are portability or great value in small bulk, durability, sameness of quality, divisibility, stability of value, and cognisability. It was soon discovered that these qualities are possessed in the highest degree by gold and silver. Other metals have been used at different times even for standard money, but all of them fail in one or more of these particulars. Iron is liable to rust, lead is too soft, tin too brittle, and copper too heavy. It may be observed that the importance of the qualities varies according to circumstances. Thus, when, as in modern societies, the greater part of wholesale transactions are effected without the intervention of material money, portability is of comparatively small importance, whilst on the other hand stability of value is of the greatest importance in all kinds of deferred payments. It is not necessary that all the primary functions of money should be fulfilled by the same thing. In Saxon times, for example, and for long after in England the standard measure of value was the pound-weight of silver, but the actual medium of exchange consisted of silver pennies. At present the actual medium of exchange consists to a great extent of bits of paper—bank-notes, cheques, and various instruments of credit—whilst the standard measure of value is a piece of gold.

So long as the attention is directed to material money, the principal questions that arise are in connection with coinage. At first, after the introduction of the precious metals, it was left to the parties concerned to test their weight and fineness with *caveat emptor* for the rule, and the present unsatisfactory state of the English gold coinage is mainly due to the survival in law of the presumption that it is the duty of the receiver of money to see that it is of full value. But the essential object of coinage is that a responsible authority should affix its stamp to small ingots of metal, in such a way as to signify their weight and purity. Simple and important as this duty appears, history is full of examples of the debasement and deterioration of coins by governments with the view of making a petty gain. It is worth noting, however, that from the earliest times (with the exception of the reign of Henry VIII.) the English silver was kept of the same fineness. It is true that the weight of the coins became gradually less, but it was probably in most cases the recognition of an accomplished fact (through ordinary wear and tear), and was not an attempt to defraud. The evils which arise from the natural or artificial debasement of coins have been well described by Macaulay in his account of the recoinage in the reign of William III. Since the primary object of coinage was simply to furnish a mark of weight and fineness, all metallic money was at first exactly what it professed to be. Thus, the old English silver pound was coined into 240 pennies; and this fact is preserved in the Troy table—20 pennyweights = 1 oz., 12 oz. = 1 pound. In process of time the actual weight of the penny became less than a pennyweight, but the same numbers were still supposed to go to the pound. Finally, a certain amount of gold of a certain fineness was declared to be equal in value to a 'pound of silver,' or rather to 240 pennies. This is historically the answer to Sir Robert Peel's famous question, 'What is a pound?' The technical answer to the question is now given by the Coinage Act of 1870 (in substance the same as that of 1816). The act declares the precise weight of the sovereign in grains, and the proportion of alloy in standard gold. Nominally, any one can take standard gold to the mint and get it coined into sovereigns or half-sovereigns free of charge; 20 pounds-weight Troy being coined into 934 sovereigns and one half-sovereign. Practically the time and trouble involved in going direct to the mint induced people to sell their gold in preference to the Bank of England, and at first (within certain narrow limits) the price varied. Now the bank is compelled to purchase all standard gold at £3, 17s. 9d. per oz., and, as it obtains from the mint £3, 17s. 10½d., there is a small profit by way of brokerage. Allowing for this small difference, it will be seen that the mint price of gold—viz. £3, 17s. 10½d.—simply refers to the number of standard coins made out of a certain amount of standard metal. It follows that this mint price is fixed and invariable so long as the law remains unchanged. Thus, if gold became as plentiful as blackberries, or as scarce as diamonds, the mint price would remain unaffected. At the same time, however, the value of gold in the sense of its purchasing power over commodities would change according to the variations in the quantity, though the precise nature and extent of the change would depend upon other elements. In some cases government makes a definite charge for coinage—that is to say, practically the weight of the coins returned is so much less than the weight of the bullion brought. This charge is called seigniorage. So long as this charge is paid, however, there is no restriction on the quantity of metal which may be converted into full standard coin.

It is necessary now to notice the distinction between standard money, in the proper usage of the term, and token money. The chief characteristics of the former are that, as just explained, it is coined to an unlimited extent, and further, that for any money contracts it is unlimited legal tender. In 'token' money these two characteristics are absent. The nature and uses of token money are also best explained historically. In the middle ages silver was very scarce, and prices were extremely low. The silver penny was originally about the size of the present threepenny-piece; consequently for the low range of prices then current it was inconveniently large and valuable. In a petition of the date of 1330 it was pointed out that 'beer is one penny for three gallons,' and that a penny is the smallest coin, and the petitioners pray that smaller coins may be struck to pay for their little purchases, and 'for works of charity.' The great practical difficulty, however, was to make very small coins of full standard value. So much was the need of small

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change felt, however, that by the time of Elizabeth the people had resorted largely to 'tokens' of lead, tin, and even leather. These 'tokens' were at first private issues, and practically were like very small promissory-notes. It was soon found that they were forced into circulation by unfair means, and then the issuers refused to change them for goods or sterling money. The remedy adopted in 1613 was to give a monopoly of striking copper or brass farthings to certain persons for a consideration. This privilege, however, was so much abused, that in many parts of the country, including London, there was hardly any gold or silver left—the whole circulation being brass farthings. The patentees tried to force these farthings on the American colonies, but it is recorded of Massachusetts—'March 4, 1634, at the General Court at New Town, brass farthings were forbidden, and bullets were made to pass for farthings.' These 'royal' tokens were no sooner suppressed, owing to the abuses which they had caused, than they were again replaced by private tokens, and it is said that over 20,000 different kinds were in use between 1648 and 1672. Evelyn in his *Diary* speaks of the tokens issued by every tavern, 'passable through the neighbourhood, though seldom reaching farther than the next street or two.'

From this slight historical sketch the principles which should regulate the issues of 'token' money stand out clearly. The smallest coins cannot be made of the precious metals of full value—e.g. a silver farthing would be less than one-tenth of the present threepenny-piece—and, accordingly, baser material must be used. Here, however, the danger arises of going to the other extreme and making the coins too large. But this is only a minor difficulty compared with the necessary condition that the token coins must bear a fixed relation to the standard coins in value. Thus we arrive at the fundamental principles of 'token' coins; they should be issued in limited quantities, be legal tender to a limited extent, and their so-called intrinsic value should be less than the nominal value. Even those nations which use both gold and silver as standard money (see BIMETALLISM) are compelled to use token coins for small values, whilst nations which have a gold standard must make all their silver coins 'tokens.' With the progress of civilisation 'representative' money, as it has happily been styled by Jevons, became of more and more importance. The Romans, for example, had a highly-developed banking system, which, however, was broken up on the disruption of the empire. In the early mediæval period bills of exchange were used for foreign payments; and that they were considered as 'representative money' is shown by the fact that in England, up to the Tudor period, their value was regulated by the Royal Exchanger, a high official connected with the mint. The development of banking in the modern sense was very slow. The earliest banks in Italy were finance companies which provided governments with loans, but the great banks of the north of Europe were expressly designed to provide good money to meet the payment of bills of exchange (see Adam Smith's account of the origin of the Bank of Amsterdam, *Wealth of Nations*, book iv.). The money in the great trading centres was drawn from various countries, and was in general debased and worn. The banks took this bad money from the merchants and gave them good bank money in return. The merchants, however, allowed the money to remain in the bank, and handed one another transfers. It was soon discovered that a small amount of actual coin was sufficient to meet all liabilities, and, accordingly, the remainder was lent. In this manner 'bank money' has in process of time come to consist of a large mass of representative money supported on a metallic basis. See BANK.

Compare, on the difficulty of defining 'money,' Sidgwick's *Principles of Political Economy*, book ii. chap. iv.; on the history of material money, Ruding's *Annals of the Coinage*, Dana Horton's *Silver Pound*, Kenyon's *Gold Coins of England*, Hawkins' *Silver Coins of England*; on tokens, Boyne's *Tokens in the Seventeenth Century*; on the 'money market,' Bagehot's *Lombard Street*; on the general principles, Jevons' *Money*, Professor F. A. Walker's *Money*, Professor Nicholson's *Money and Monetary Problems*. For the connection of money and prices, see PRICE. See also BULLION, CURRENCY, WEIGHTS AND MEASURES, CROWN, DOLLAR, GROAT, GUINEA, NUMISMATICS, SHILLING, &c.

Money-lending. See USURY.

Money-wort, a name given to various plants—Dioscoreæ, Lythraceæ, Thymus, &c.

Monge, GASPARD, a French mathematician and physicist, was born of humble parentage at Beaune, in the department of Côte d'Or, 10th May 1746. When only fifteen, he went to study natural philosophy at the Oratorian College of Lyons, and afterwards obtained admission into the famous artillery school at Mézières, where he invented the method known as 'Descriptive Geometry.' In 1780 he was chosen a member of the French Academy, and was called to the Paris Lyceum as professor of Hydrodynamics. During the heat of the Revolution he became minister of Marine, but soon took charge of the great manufactories for supplying republican France with arms and gunpowder. After he had founded the École Polytechnique, he was sent by the Directory to Italy. Here he formed a close friendship with Bonaparte, and, following him to Egypt, undertook the management of the newly-founded Egyptian Institute. On his return to France, he resumed his functions as professor in the École Polytechnique, and, though his reverence for Napoleon continued unabated, he hotly opposed his aristocratic and dynastic views. The title of Count of Pelusium was conferred on him by Napoleon. He died 28th July 1818. His principal works were *Traité Elémentaire de Statique* (1788), *Leçons de Géométrie Descriptive* (1795), and *Application de l'Analyse à la Géométrie* (1795).

Monghyr, a picturesque city of Bengal in India, on the right bank of the Ganges, 80 miles E. by S. of Patna, consists of the fort, a rocky crag projecting into the river, and the native quarters. From the 12th century onwards it was a place of considerable strength; in the 18th century Mir Kasim made it his headquarters. He established an arsenal, and its armourers are still famed. Pop. 55,372.—The *district* has an area of 3921 sq. m., with a pop. (1881) of 1,969,774.

Mongols, an Asiatic people belonging to the Ural-Altaic branch of the human family, derive their name from a word *mong*, which means 'brave,' 'bold.' Their origin and early history are lost in a dim antiquity. Chinese annals first speak of them as dwelling, 6th to 9th century, in what is now Mongolia north of the desert of Gobi, and in the regions south of Lake Baikal. The origin of the royal house is enshrouded in myths, the maternal ancestor being by tradition a she-wolf; probably the house was descended from a ruling family of the Turks (Hiung-nu). The cradle of the Mongol people seems to have been on the plains between the river Onon, the Orkhon, and the Kerulon, the latter a tributary of the Argun. It was in that region that Genghis Khan was born, and in that region that he fixed his permanent camp or capital, at a place called Karakorum. An ancestor of the great conqueror ruled in the middle of the 12th

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century over a confederation of Mongol tribes powerful enough to be a serious menace to the Kin empire of North China; and at the same time he was able to carry on a bitter contest against the Tartars. That the confederation was loose—probably the only tie was the compelling will of the energetic chieftain—is indicated by Temujin's (i.e. Genghis Khan's) early struggles. It was only by dint of hard fighting and tenacious persistency that he was able to maintain undiminished the power possessed by his father, and his father's father before him. But the conqueror's genius was in him, and he died supreme monarch of all central Asia (see GENGHIS KHAN). By his will his conquests and territories were divided amongst his sons; the third, Ogotai, succeeded him as khakan or chief khan of all the Mongol people. Batu and Orda, the sons of the eldest son (Juchi), were invested with Khwarezm, the region watered by the rivers Ural, Oxus, and Jaxartes; Jagatai, the second son, received the territories between Bokhara, the Irtish, and the Gobi; the region between the Irtish and Lake Baikal was assigned to Ogotai; and to the youngest son, Tuli, was given the home country south of the Baikal. The first care of Ogotai was to complete, in conjunction with his brother Tuli, the conquest of North China. The capital of the Kins was taken in 1234, and, the last emperor of the dynasty having hanged himself, the Mongol ruler became emperor in his stead. North China having been thus subdued, Ogotai proceeded to conquer China south of the Yellow River, then governed by the Sung dynasty, and to reduce Corea. Meanwhile another army, commanded by Batu, attacked and subdued the principalities of what is now Russia—Bulgaria on the Volga, Riazan, Moscow, Vladimir, Kieff. The force then divided: one division under Batu entered Hungary, crushed the Hungarians at Mohi near Tokay, and captured Pesth and Gran (1241); the other division overwhelmed the Poles near Liegnitz, and pushed on into Moravia. During the same period yet another Mongol army was assailing Khwarezm, which the son of the former ruler had recovered. This army drove Jelal ud-Din out of his kingdom, overran Azerbijan, and in 1236 Armenia and Georgia, in all of which campaigns their path was marked by terrible cruelties and atrocities. Ogotai died in 1241. Kuyak, his son and successor, reigned seven years, and he was followed by his cousin Mangu, a son of Tuli. Both princes favoured Christianity. During Mangu's reign his brother Hulagu won great fame as the punisher of the Assassins (Ismaelites) in Persia, and as the destroyer of the califate of Bagdad. Moreover, he subjugated Syria, and captured Aleppo and Damascus, and threatened Jerusalem. Invested with these countries, he founded the kingdom of the Ilkhans in Persia (q.v.). Mangu's successor was his illustrious brother Kublai (q.v.) Khan, whose descendants ruled over China (q.v.) from 1294 to 1368. This eastern division of the Mongols was expelled from China, and its power finally crushed by the Chinese, in the end of the 14th century. The same people gradually absorbed in the following centuries the various small bodies of Mongols scattered over the centre of Asia, from the Great Wall to the Altai Mountains on the west and Tibet on the south-west. In the west of Asia and the east of Europe were formed the Kipchak (q.v.) states—in Russia, the Golden Horde, which subsequently broke up into the Tartar (q.v.) khanates of Kazan, Astrakhan, and the Crimea; in Turkestan, the Uzbeg (q.v.) principality, out of which grew the khanates of Bokhara and Samarcand. Towards the end of the 14th century Toktamish made himself chief of the eastern Kipchaks, and united thereto the chieftainship of the Golden Horde; but his power was crushed by the greater Tamerlane (q.v.). In 1519 Baber (q.v.), a descendant of Genghis' son Jagatai, founded the Mogul empire in India. The Kalmucks (q.v.) also belong to the western branch of the Mongols.

The total number of Mongols now under Chinese rule is estimated at two millions. They live for the most part in the immense plateau of central Asia called Mongolia (area, 1,288,000 sq. m.), which is girdled on all sides by lofty mountain-chains (Altai, Thian-Shan, Chingan, &c.). Its southern portion consists of the vast desert of Gobi. These people are still nomads, as their historic ancestors before them always were. Their wealth consists in flocks of sheep, herds of horses (small, but very enduring), cattle, camels, and goats. They are mostly Buddhists, though those in the west are in part followers of Shamanism, as all Mongols were before the days of the great conqueror. As a rule they are hospitable, though indifferent to personal comfort, addicted to cattle-stealing and to drink, but when sober good-hearted and friendly; on the whole, life being easy and their wants few and simple, they display a lack of foresight, and are lazy and dirty. They dwell in tents, which are their only protection against the violent sandstorms of summer and the still more terrible snow-hurricanes of winter. They are fond of making religious pilgrimages to Urga (q.v.), the religious capital of the country, and to various other shrines in China and Mongolia. Kalgan and Kiachta are the principal commercial centres. It is difficult to estimate the numbers of the western Mongols, as they have in many parts commingled with their Turkic neighbours; but see such articles as Kipchaks, Kirghiz, Russia, Siberia, Tartars, Turkestan, &c. The Buriats (q.v.), almost entirely subject to Russia, are a branch of the Mongol race.

The term Mongolic is used by ethnologists to describe the group of cognate languages which constitute one division of the Turanian (q.v.) family of speech. What Mongol literature there is consists for the most part of translations of religious works from Tibetan and Chinese, historical works (notably the chronicles of Ssanang Setsen in the middle of the 17th century), of folk and fairy tales, and a few poetic productions. Perhaps the best known of the folk-tales are the collection entitled *Siddhi-'Kûr* (ed. Jülg, 1868). Others have been published by the same scholar (1866–69), by Bergmann (1804–5), I. J. Schmidt (1839), and Russian savants.

See Howorth, *History of the Mongols* (1876–88, where full bibliographical details will be found), and Gilmour, *Among the Mongols* (1888).

Mongoose. See ICHNEUMON.

Monica. See AUGUSTINE.

Monier-Williams. See WILLIAMS.

Monism, a philosophical theory that all being may ultimately be referred to one category. Thus idealism, pantheism, materialism are monisms, as opposed to the Dualism (q.v.) of matter and spirit. See PHILOSOPHY.

Moniteur, Le, a French journal, started by the publisher Panckoucke, 5th May 1789, under the title of the *Gazette Nationale, ou le Moniteur Universel.* During the Revolution its reports, &c. were of very great importance, and its value was immensely increased when, in 1800, it was made the official organ of the government. It retained the privilege (without the first title, *Gazette Nationale,* which was dropped in 1811) down to 1869, when it was supplanted by the *Journal Officiel.* Afterwards it was issued as an Orleanist or private Conservative paper.

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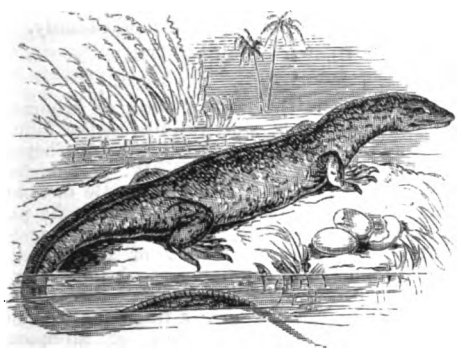
Monitor, a name given to a genus of Lizards somewhat isolated from other lizards in structural characters; in some respects they approach the Crocodilia, which are the highest of existing reptiles. They are the largest of existing lizards; a specimen acquired by the College of Surgeons in London measured 6 feet 10 inches. The tail of the greater number is laterally compressed, the better to adapt them to aquatic habits. They have received the name Monitor from a notion that they give warning by a hissing sound of the approach of a crocodile or alligator. There is only one genus, with many species.—The Monitor or Varan of the Nile



Monitor (*Varanus niloticus*).

(*Varanus niloticus*) is of a rather slender form, and has a long tail. It is olive-gray, mottled with black. It attains a length of five or six feet. Crocodiles' eggs or young crocodiles form the chief part of its food. It is a curious superstition in India, that the young of the monitor is more deadly than the most venomous serpent.

Monitor. See NAVY.

Monitorial System, or MUTUAL INSTRUCTION. It first occurred to Dr Andrew Bell (q.v.), when superintendent of the Orphan Hospital, Madras, in 1795, to make use of the more advanced boys in the school to instruct the younger pupils. These youthful teachers were called Monitors. The method was eagerly adopted by Joseph Lancaster, who in the first years of the 19th century did so much for the extension of popular education; and, from him and the originator, the system was called indifferently the Madras and the Lancastrian, as well as the Monitorial or Mutual System. See EDUCATION, Vol. IV. p. 210. The monitorial system is not, as is commonly supposed, a method of teaching; it is simply a method of organising schools, and of providing the necessary teaching power. At a time when the whole question of primary education was in its infancy, the state refusing to promote it on the ground that it was dangerous to society, and the public little disposed to contribute towards its extension, it was of great importance that a system should be adopted which recommended itself as at once effectual and economical. But the importance of the system as an educational agency was universally overrated, and in the end broke down.

Monk, GEORGE, Duke of Albemarle, soldier of fortune and restorer of the English monarchy, was the second son of Sir Thomas Monk of Potheridge, near Torrington, North Devon, and was born either there or at Lancross on 8th December 1608. He saw service first in the expeditions to Cadiz and Rochelle (1625–27), and then for nine years in Holland, returning to England in 1639, in time to take part in the two Bishops' Wars with the Scots. In 1642–43 he commanded a regiment against the Irish rebels, in 1644 was taken prisoner at Nantwich by Fairfax. He lay two years in the Tower, where he solaced himself with frail, ugly Nan Ratsford or Clarges (his future duchess), and whence he freed himself by taking the Covenant—Clarendon hints that he did so for money. As major-general in Ulster he so commended himself to Cromwell, still more by his brilliant conduct at Dunbar (1650), that next year he was left to complete the subjection of Scotland. In 1653 he was associated with Blake and Deane in naval operations against the Dutch, and won two great sea-fights over Tromp (q.v.); in 1654 Cromwell sent him back to Scotland as governor, in which difficult office he acquitted himself with vigour, moderation, and equity. Even the Highlands were reduced to order. His home for five years was Dalkeith, where he 'was ever engaged in business or in planting, which he loved as an amusement and occupation.' After Cromwell's death, seeing everything in confusion, and a splendid chance open to him who dared seize it, on New-year's Day 1660 he crossed the Border with 6000 men, and five weeks later entered London unopposed. So far he had kept his intentions profoundly secret. Still every one felt that the decision lay with 'Old George;' every party courted him; the Republicans even offered him the protectorate. But, while he offended nobody, he declined to connect himself with any of the sectaries, and waited patiently the course of events. From the first, his own wish, dictated by no high motive, had been to bring back the Stuarts; and before long he saw that the nation at large was with him. The freeing of the Rump parliament from the army, the readmission of the excluded members, and the election of a new parliament—these were his wary steps towards the Restoration; on 23d May he welcomed Charles II. on the beach at Dover. Monk now was made Duke of Albemarle, and entrusted with the highest offices in the state. But he soon retired from political affairs. In 1665, when the plague ravaged London, and every one fled that could, as governor of the City he stuck bravely to his post, and did his best to allay the panic and confusion. Next year he was employed as second in command of the fleet sent under the Duke of York against the Dutch, and was defeated by De Ruyter in a sea-fight off Dunkirk, but soon after gained a bloody victory over him off the North Foreland. He died, sitting in his chair, at Newhall, his Essex seat, on 3d January 1670, and was buried in Westminster Abbey. 'A man,' says Guizot, 'capable of great things, though possessing no greatness of soul.'

See, besides works cited at CHARLES I., CROMWELL, and CHARLES II., the Lives of Monk by Gumble, his chaplain (1671), Skinner (1723), Guizot (Eng. trans. 1851), and Corbett (1889), the last a eulogy.

Monk, MARIA (*c.* 1817–50), a woman of bad character who pretended in 1835 to have escaped from the Hôtel Dieu nunnery at Montreal, and who, coming to New York, found a good many credulous adherents, and published *Awful Disclosures* and *Further Disclosures*, which had an enormous sale.

Monkey. This term may be conveniently restricted only to all the Primates exclusive of the Anthropoid Apes (q.v.). It has been sometimes applied to the tailed forms only, the rest being spoken of as Apes. This use of the words monkey and ape is ill-judged, inasmuch as it implies that the non-anthropoid Primates are divisible into tailed and tailless species. The real distinction is not to be found in this character. The quadrumana as a whole are divisible into three great groups—(1) Anthropoid Apes; (2) Platyrrhini, the New-World monkeys; (3) Catarrhini, the

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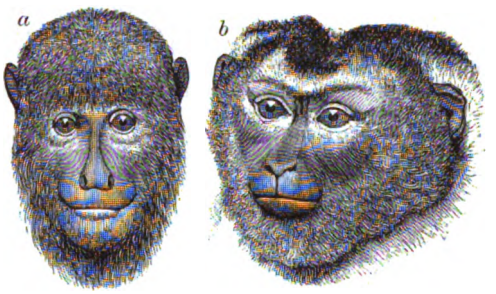
Old-World monkeys. It is the two latter divisions that are dealt with in the present article.

In the Platyrrhini the nostrils are far apart; the tail is prehensile, and the number of premolar teeth is in excess of that of the Catarrhini, the dental formula being (for the molars and premolars) p.m. $\frac{3}{3}$–$\frac{3}{3}$, m. $\frac{3}{3}$–$\frac{3}{3}$. In the marmosets the formula is p.m. $\frac{2}{2}$–$\frac{3}{3}$, m. $\frac{2}{2}$–$\frac{3}{3}$; this, coupled with some other peculiarities in their anatomy, led to the institution of a distinct group—Arctopithecini, regarded as equivalent to either the Platyrrhini or Catarrhini. They are now, however, more usually referred to the Platyrrhini, though placed in a separate family.



a, Platyrrhine face (*Myctes villosus*); *b*, Catarrhine face (*Macacus leoninus*).

In the Old-World monkeys, or Catarrhini, the nostrils are near together; the number of teeth 32, and these arranged as in the anthropoid apes and man; the molars and premolars being p.m. $\frac{2}{2}$–$\frac{3}{3}$, m. $\frac{3}{3}$–$\frac{3}{3}$—the reverse of the condition seen in the Marmosets. The tail, when present, is never prehensile; and three are frequently ischial callosities developed, which structures are entirely unknown among the American monkeys.

The two divisions of the monkey tribe based upon those characters are absolutely distinct in their geographical distribution. The Platyrrhini are only found in America, the Catarrhini are limited to the Old World; further than this, the fossil species, which have not been found in strata earlier than of the Miocene period, show the same rigid correspondence between structure and distribution. No Platyrrhine has been met with in the Old World, and no Catarrhine in the New. Whether this indicates that the monkeys of the two hemispheres have had an independent origin or not, is a matter for further inquiry; it must indicate in any case the remoteness of the period during which there was a passable land connection between Asia and America.

In both the Old and New Worlds monkeys are almost confined to the more tropical districts; and yet this is not entirely due to an incapacity for bearing a rigorous climate, for monkeys occur high up on the sides of mountains in India. Monkeys do not occur in the tropical parts of Australia. During the Miocene and Pliocene periods these animals inhabited Europe and even England, for the remains of a Macaque have been described from the county of Essex. At present the only trace left in Europe of these inhabitants is the *Macacus inuus* or Barbary Ape, which occurs on the Rock of Gibraltar as well as on the opposite coast of Africa. But this animal is perhaps not truly indigenous; it may have been introduced.

In the New World monkeys are most abundant in South America. The forests of the Amazon and the Orinoco may be regarded as their headquarters. There are only ten species which occur north of the Isthmus of Panama, and only one of these extends its range into Mexico; this is a Spider Monkey. The West Indian islands contain no indigenous monkeys. The American monkeys are all arboreal; and this of course limits their range to forest-clad districts. The prehensile tail has an obvious relation to their mode of life. But it is a most singular fact that the long-tailed monkeys of the Old World, which might often gain considerable advantage from being able to use their tail as a grasping organ, are totally unable to do so.

Some of the more remarkable kinds of monkeys are noticed in separate articles (BABOON, BARBARY APE, ENTELLUS, HOWLER, MARMOSET, &c.).

Monk-fish, another name for the Angel-fish (q.v.), was also applied in the 16th century to a large specimen of the Loligo or Squid family.

Monk's-hood. See ACONITE.

Monk's Rhubarb. See DOCK.

Monmouth, the county town of Monmouthshire, stands, girt by wooded hills, at the influx of the Monnow to the Wye, 16 miles N. of Chepstow, 18 S. of Hereford, and 26 WSW. of Gloucester. Its chief features are the ruined castle of John of Gaunt, in which Henry V. was born; the parish church, dating from the 14th century, and restored in 1882 by Street at a cost of £7000, with a graceful spire 200 feet high; the bridge over the Monnow (1272), with its 'Welsh gate,' and near it, a small Norman chapel; a fragment of a Benedictine priory, with 'Geoffrey of Monmouth's study;' the new town-hall, built in 1888 at a cost of £10,000; and a grammar-school (1614). In the neighbourhood are the temple-crowned Kymin (800 feet), commanding a glorious view; the Buckstone, a rocking-stone, displaced by tourists in 1885, but since re-poised; and, 7 miles SW., the superb ruins of Raglan Castle, defended for ten weeks in 1646 against Fairfax by the old Marquis of Worcester. First chartered by Edward VI., Monmouth unites with Newport and Usk to return a member. Pop. (1851) 5710; (1881) 6112. See *Charters of Monmouth* (1826), and works by Heath (1804) and Greene (1870).

Monmouth, capital of Warren county, Illinois, is 179 miles by rail WSW. of Chicago. It is the seat of Monmouth College (United Presbyterian, 1856), with about 400 students, and manufactures agricultural implements, sewer pipes, and cigars. Pop. (1890) 5837.

Monmouth, JAMES, DUKE OF, was born at Rotterdam, 9th April 1649, the son of 'browne, beautiful, bolde, but insipid' Lucy Walters (1630–83), by Charles II., she said, but more likely by Colonel Robert Sidney, to whom and to whose brother Algernon she had lately been mistress. When in 1656 she came with her son to London, she was treated as the king's wife, and by Cromwell was sent to the Tower, and then back to Paris. Charles sought out the boy and committed him to the care of Lord Crofts, who gave him his own name. In 1662, after the Restoration, 'Mr James Crofts' came to England with the queen-dowager, and was handsomely lodged at Hampton Court and Whitehall. In 1663 he was created Duke of Monmouth, and wedded to a rich heiress, Anne, Countess of Buccleuch (1651–1732); in 1670 he succeeded Monk as captain-general of the forces, and in 1673 received the additional title of Duke of Buccleuch. A poor, weak libertine, he yet became the idol of the populace, thanks to his beauty and his affability, to his humanity towards the Covenanters at Bothwell Bridge (1679), to the agitation of the Popish Plot and the Exclusion Bill, and to his two semi-royal progresses in the west and the north of England (1680–82). There were rumours of his legitimacy, the proofs in a certain 'black box;' and Shaftesbury knew well how to pit the 'Protes-

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tant Duke' against the Popish heir-presumptive to the throne, how to enmesh him in the Rye-house Plot (1683), on whose discovery Monmouth fled, as four years before, to the Low Countries. There he remained until Charles's death, when, in concert with Argyll's Scotch expedition, with eighty-two followers he invaded England. On 11th June 1685 he landed at Lyme-Regis, and issued a manifesto branding James as a murderer and popish usurper, and asserting his own legitimacy and right to the crown. He was received with acclamations at Taunton, where he was himself proclaimed King James II.; and on the early morning of 6th June, after a roundabout march to near Bristol and Bath, he attempted with 2600 foot and 600 horse (peasants mostly and miners), to surprise the king's forces, 2700 strong, which under the Earl of Feversham were encamped on Sedgemoor, near Bridgwater. His men could not cross a broad drain, and were mowed down by the royal artillery, 300 falling on the field, 1000 more in the pursuit. Monmouth himself had fled, but on the 8th was taken, disguised as a shepherd, in a ditch near Ringwood. His bearing before James was dastardly. He wept; he crawled to his feet; he even offered to turn Catholic. No: on 15th July he was bunglingly beheaded upon Tower Hill, and buried in the chapel of St Peter-ad-Vincula. His duchess had borne him six children; but his last thoughts were all with his mistress, Lady Henrietta Wentworth, who died of sorrow nine months after him. In the 'Bloody Assize' that followed the rebellion, Judge Jeffreys hanged 331 rebels, transported 849 to the plantations, and whipped or fined 33 others.

See G. Roberts, *Life of Monmouth* (2 vols. 1844), with works cited at CHARLES II. and JAMES II.

Monmouthshire, a county in the west of England, bounded NE. by Hereford, E. by Gloucester, S. by the estuary of the Severn, and W. and NW. by South Wales. With a maximum length and breadth of 32 and 28 miles, it contains 578 sq. m., or 370,350 acres, of which more than one-half is under permanent pasture, and about one-twelfth in woods. Pop. (1801) 45,582; (1841) 134,368; (1881) 211,267. Its surface is for the most part hilly, especially in the north and north-west (the Sugar Loaf is 1954 feet high), but the Caldicot and Wentloog Levels, which for a distance of 25 miles skirt the southern coast, are so low as to require in places the protection of sea-walls and earthworks. The Wye, with its tributary the Monnow, the Usk, Ebwy, and Rumney, all flowing south into the estuary of the Severn, are the principal rivers. In the rich valleys of the three former wheat is the principal crop raised, whilst on the poorer soils on the west side of the county oats and barley are chiefly grown. There are also extensive orchards. The great wealth, however, of Monmouthshire is derived from its minerals, coal and ironstone abounding in the region of Pontypool and Rhymney. In 1889 coal weighing 6,751,308 tons and of the value at the pit's mouth of £2,503,610 was raised; nearly 400,000 tons of pig-iron were made, and much limestone and other building stone, as also fireclay, produced. The county comprises six hundreds, the municipal boroughs of Monmouth and Newport, and 147 civil parishes. Three members are returned to parliament for the county, and one for the combined borough of Monmouth, Newport, and Usk; the County Council numbers 64. Towns other than the above are Abergavenny, Blaenavon, Caerleon, Chepstow, and Tredegar. Monmouthshire, which until 1535 formed part of Wales, is noted for its beautiful scenery and for the many remains of feudal castles, &c. scattered throughout it. Of these the finest examples are the castles of Raglan, Caldicot, and Chepstow, and the abbeys of Llanthony and Tintern. See the county histories by Williams (1796) and Coxe (1801).

Monochlamydeæ. See CALYX, FLOWER.

Monochord, an apparatus constructed to exhibit the mathematical proportions of musical intervals. It consists of a flat board of 4 or 8 feet long, or better 16 feet, where space can be spared. The breadth of the board is according to the number of the strings, which are from two to six. The board is covered with fine white paper. A straight line is drawn from end to end below each string, and each line is accurately divided into the different proportions into which the full length of the string, as a fundamental sound, harmonically divides itself (see HARMONICS). The string is fixed at one end, and rests on a bridge; while at the other end, where it also rests on a bridge, it is stretched by a tuning-peg, or by a weight. The sounds from the strings are produced by a violin-bow. The monochord is chiefly used in illustrating acoustical experiments in the proportion of intervals and temperament.

Monoclinal Strata. See GEOLOGY, MOUNTAINS, STRATIFICATION.

Monocotyledons. The higher phanerogams are distinguished from the Gymnosperms by their closed ovary as Angiosperms, and there fall into two main alliances, recognised by Ray and other predecessors of Linnæus as monocotyledons and dicotyledons. The former are readily distinguished, as the name implies, by the single cotyledon of the embryonic plant, but also by a number of other important structural characters. Thus, the primary root (although it may develop strongly in germination, as in palms, lilies, maize, &c.) soon ceases to grow, and is replaced by lateral (adventitious) roots. The axis of the embryo also often dies away after producing lateral shoots, which may die in turn, and so on (e.g. sympodial rhizome of Solomon's Seal, tubers of orchids, &c.), but frequently also lengthens into the primary stem of full-grown plant (e.g. palms, aloe, maize, &c.); while young it grows (as in ferns) in the form of an inverted cone, each successive section being longer than the preceding until the adult size is reached, when the stem becomes cylindrical, tapering off only at the extreme point. There is thus usually no secondary growth in thickness (see, however, DRACÆNA). The leaves are seldom whorled, and the arrangement in two alternating rows is commonest. The leaf-bores are usually sheathing, and stipules are absent. The lamina is usually entire, the venation not ridged on the under side, and usually parallel. The fibro-vascular bundles of the stem do not anastomose nor form a ring, but are distributed throughout the whole stem, which thus does not exhibit the pith nor separable bark so familiar in many dicotyledons. The flower consists of alternating and isomerous whorls, outer and inner perianth, outer and inner stamens, and usually only one carpellary whorl; but from this type many characteristic specialisations arise. The endosperm is usually large and persistent, but some orders are exalbuminous.

The systematic study of the monocotyledons is most easily undertaken by clearly familiarising one's self with the Liliaceæ and their immediate allies, Amaryllidaceæ, Iridaceæ, &c.; and next by studying the progress of the floral specialisation, through Scitamineæ to its extreme in Orchidaceæ. Starting again from the lilies and their scarcely distinguishable allies, the rushes (Juncaceæ), we easily distinguish one series of degenerative (or more accurately vegetative) types, culminating in the sedges (Cyperaceæ) and grasses, commonly grouped as Glumifloræ. Another somewhat analogous line of change gives us the palms and Aroideæ,

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grouped at Spadicifloræ. The Helobiæ (including Juncagineæ, Alismaceæ, Hydrocharidaceæ) are also of special interest, as representing in some respects more primeval forms, and pointing back to a common ancestry with dicotyledons. See VEGETABLE KINGDOM, and minor special articles; also Goebel's, Van Tieghem's, or other text-books of botany. For systematic details, see Engler's *Pflanzenfamilien* or the *Genera Plantarum*.

Monod, ADOLPHE, an active theologian of the Reformed Church, was born in 1802 at Copenhagen, the son of a preacher, himself a native of Geneva. He studied at Geneva, and laboured as a preacher at Naples and Lyons, as a professor at Montauban, and again as a preacher in Paris until his death, 6th April 1856. He published sermons and many religious works which were widely popular.—His brother, FRÉDÉRIC, born 17th May 1794 at Monnaz, in the canton of Vaud, was thirty years a prominent pastor in Paris, and founded in 1849, together with Count Gasparin, the Free Reformed Church of France. He edited until his death, 30th December 1863, the *Archives du Christianisme*. See Adolphe's Life and Letters (Eng. trans. 1885).

Monodon. See NARWHAL.

Monœcious (Gr. *monos*, 'one,' and *oikion*, 'a habitation'), a term introduced by Linnæus to describe those plants which have the stamens and pistil in different flowers, but upon the same plant —e.g. hop, box, birch, beech, alder, oak, hazel. Such plants formed one of the classes (Monœcia) of the Linnean system, but were obviously a specially artificial alliance, since that partial or complete separation of the sexes to which we apply the terms monœcious or diœcious respectively arises continually among the most unrelated plants or animals. See FLOWER, SEX.

Monogenists. See ETHNOLOGY.

Monogram (Gr.), a character composed of two or more letters of the alphabet, often interlaced with other lines, and used as a cipher or abbreviation of a name. A perfect monogram is one in which all the letters of the word are to be traced. They are found on early Greek coins, medals, and seals, and on the family coins of Rome, but not on the coins of the earlier Roman emperors. Constantine placed on his coins one of the earliest of Christian monograms, composed of the first and second letters of ΧΡΙΣΤΟΣ (Christos), a monogram which also appeared on the Labarum (see CROSS, Vol. III. p. 582; and CONSTANTINE); we often find it combined with the first and last letters of the Greek alphabet (Rev. i. 8). Another well-known monogram is that of the name of Jesus, IHS, from the first three letters of ΙΗΣΟΥΣ. Popes, emperors, and kings of France during the middle ages were in the practice of using a monogram instead of signing their names. Fig. 1 represents that of Charlemagne, a perfect monogram, in which all the letters of *Karolus* can be traced. Painters and engravers in Germany and Italy have used monograms to a large extent as a means of distinguishing their works. Fig. 2 is the monogram of Albert Dürer. The first typographers made use of monograms or ciphers, a series of which, well known to the bibliographer, fixes the identity of the ancient editions, German, Italian, and English, from the invention of printing down to the middle or end of the 16th century. Those of William Caxton and Gaspard Philippe, an old Paris printer, will be found at BOOK, Vol. II. p. 303. See Brulliot, *Dictionnaire des Monogrammes* (1834); Duplessis, *Dictionnaire des Marques* (Paris, 1887). Potters' marks will be found at POTTERY.

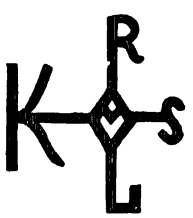

Fig. 1.

Fig. 2.

Monograph (Gr.), a work in which a particular subject in any science is treated by itself, and forms the whole subject of the work—'an all-sided and exhaustive study of a special or limited subject,' as it has been called. Monographs have contributed much to our knowledge, especially in the department of the natural sciences. The term, however, is often loosely used for a small book on miscellaneous topics.

Monolith. See STANDING-STONES.

Monomania. See INSANITY.

Monongahe'la, a river which rises in West Virginia and flows north to Pittsburgh, where it unites with the Alleghany to form the Ohio.

Mono'physites, Christians who hold that Christ has only *one* nature (Gr. *monos*, 'one;' *physis*, 'nature'). See GREEK CHURCH, Vol. V. p. 398.

Monopoli, a town of Southern Italy, on the Adriatic, 43 miles by rail NW. of Brindisi, with a cathedral, ancient walls, and a castle built in 1552 by Charles V. Pop. 13,154.

Monopoly is properly definable as the sole or exclusive right of selling or trading enjoyed by an individual or group of individuals. In its strict sense monopoly belongs to an economic era which has passed away. During mediæval times and the period that followed, exclusive rights prevailed in almost all departments. There were manorial rights which circumscribed individual action. The city and the guild had their spheres of production and of trade more or less clearly defined, and more or less thoroughly recognised in practice. The central governments which arose on the ruins of the mediæval system continued to recognise such exclusive rights, sometimes conferring on favoured individuals the sole privilege of selling the most necessary articles of life, in other cases granting to great companies the monopoly of trade over immense regions of the world. It is with these instances that the name monopoly is most strictly associated in history. The last parliament of Elizabeth, held in 1601, pronounced an emphatic condemnation of the monopolies granted by that queen, and even she had to yield to the storm. Salt and coal were among the articles whose sale was thus subject to monopoly. One of the members made a sensation by asking: 'Is not bread among the number?' Curiously enough, the previous year saw the foundation by royal charter of the greatest of the companies which were based on the exclusive right of trade in an immense foreign market, the East India Company. The opposition to monopolies at home continued under the Stuarts, and their abolition may be regarded as one of the important results of the great parliamentary struggle of that time.

The spread of freedom has tended to the abolition of such monopolies, whether vested in individuals, in trade corporations, or in great companies engaged in foreign commerce. But, while the monopoly of law has so far passed away, new tendencies towards a monopoly of fact have been setting in. Under the prevalent system it is still the aim of the competitor to secure as far as possible the exclusive sale of the commodity in which he deals, either in the world-market or over a given portion of it; and when the single competitor is not strong enough to accomplish this, he seeks to attain his object by combination with a group of those engaged in the same business. The modern *trust* syndicate or union is the outcome of such efforts; and the great danger attendant on such gigantic combinations is the establishment of a monopoly

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injurious to society. The trust considered in its social and economic aspects offers a wide problem for discussion; there can be no doubt that it establishes or seeks to establish a monopoly of fact. As regards the United States it may be maintained that such a monopoly is favoured by Protection; but in view of the fact that the same tendency is observable in England, where free competition with all the world exists, it should be considered whether such combinations are not a 'natural' outcome of the prevailing economic system. We have here merely to point out that in all such combinations, whether operating over the whole world-market or over a portion of it, the tendency towards a monopoly of fact is involved. In conclusion, reference should be made to monopolies, as in tobacco, retained by certain governments, but purely for revenue purposes. It was part of the later fiscal policy of Bismarck to establish such a state monopoly in spirits. See FARMERS-GENERAL.

Monotheism, the term usually employed to denote a belief in the unity of the Godhead, or belief in and worship of one God. It is thus the opposite of *Polytheism*. The doctrine of the Trinity is thought by some (e.g. the Unitarians) to be incompatible with the monotheism taught by Jesus Christ, and is therefore rejected as no part of His teaching. Mohammedans and Jews, of course, reject with vehemence the least approach to a Trinitarian conception of the Deity.

Monothelism (Gr. *monos*, 'single,' and *thelein*, 'to will'), the doctrine that Christ had only one will. It is a modification of Eutychianism. See EUTYCHES; GREEK CHURCH, Vol. V. p. 398.

Monotrem'ata (Gr. *monos*, 'single;' *trēma*, 'an opening'), the lowest order of mammalia, in many of their characteristic points indicate an approximation to reptiles. The skull is smooth; the brain-case very small as compared to the face; the snout much prolonged, and the jaws unprovided with soft movable lips, and not furnished with teeth, except in the young Ornithorhynchus, where they have been discovered by Poulton and Thomas. The cranial bones coalesce, as do a bird's, at a very early period, and leave no signs of sutures. The external ear is altogether absent; while the eyes, though small, are perfectly developed.

The bones of the shoulder, forming the scapular arch, are unlike those of any other mammals, and resemble those of reptiles. At the top of the sternum is a T-shaped bone, formed by the union of the two clavicles, corresponding to the *furculum* in the bird's skeleton, and to the clavicles and interclavicle of the reptile. The coracoid bones, which in other mammals are mere processes of the scapula, are here extremely large, and assist in strengthening the scapular arch; they are produced beyond the socket of the humerus (the glenoid cavity), so as to articulate with the sternum. The pelvis is provided with marsupial bones. The ovaries are analogous to those of the Sauropsida (reptiles and birds), the right ovary being comparatively undeveloped, while the left forms a racemiform mass. The orifices of the urinary canals, the intestinal canal, and the generative canal open, as in birds and reptiles, into a common cloaca, from which circumstance the order Monotremata derives its name. The ova (as has been shown by Poulton for Ornithorhynchus, and by Beddard and Caldwell for Echidna) are of large size, and contain an immense amount of yolk, as in the reptile or bird. Caldwell has discovered also the important fact that the early stages of development are like those of a reptile, and has confirmed the earlier discovery that these mammals lay eggs furnished with a thick shell. The Echidna carries its eggs in its pouch, but the Ornithorhynchus deposits them in its burrow. The mammary glands, of which there is only one on each side, are not provided with nipples, but open by simple slits on each side of the abdomen. It has been proved, moreover, that the mammary glands are altogether different from those of other mammals, and only functionally resemble them.

This order includes only two or three species, all natives of Australia or Van Diemen's Land, which, however, form two families—the Ornithorhynchidæ (see ORNITHORHYNCHUS) and the Echidnidæ (see ECHIDNA). It appears probable from what is now known of the teeth of Ornithorhynchus that some of the Mesozoic mammalian remains which were formerly referred to the Marsupialia are really those of Monotremata. The literature of the group is fully referred to in *The Catalogue of Marsupialia and Monotremata* (British Museum).

Monreale, a city of Sicily, 5 miles SW. of Palermo. The 'royal mount,' from which it gets its name, is 1231 feet high, and on it stands the famous cruciform Norman cathedral (1176), which measures 333 by 132 feet, and within is entirely covered with mosaics. Pop. 13,898.

Monro, ALEXANDER, founder of the medical school of Edinburgh, styled *primus* to distinguish him from his son and successor, was born in London, September 8, 1697. His grandfather, Sir Alexander Monro, a colonel in the army of Charles II. at the battle of Worcester in 1651, was afterwards an advocate at the Scottish bar. Alexander studied at London under Hawksbee, Whiston, and Cheselden, at Paris under Bouquet, and at Leyden under Boerhaave, and after 1719 lectured at Edinburgh on anatomy and surgery. His lectures, with those of Alston on botany, led to the founding of the medical school, when Monro was appointed professor of Anatomy in 1721. He was received into the university in 1725. For forty years he lectured regularly on anatomy and surgery from October to May, students coming from all parts of Britain to hear him. Of the establishment of the Royal Infirmary of Edinburgh he was one of the two principal promoters, and he there delivered clinical lectures. In 1759 he resigned the anatomical chair to his youngest son, Dr Alexander Monro, but continued his clinical lectures at the Infirmary. His principal works are *Osteology* (1726), *Essay on Comparative Anatomy* (1744), *Observations Anatomical and Physiological* (1758), and an *Account of the Success of Inoculation of Smallpox in Scotland* (1765). He died July 10, 1767. He was a Fellow of the Royal Society of London, and of various foreign societies. A collected edition of his works, with Life, was issued by his son (1781).

ALEXANDER MONRO, *secundus* (1733–1817), youngest son of the preceding, studied at Edinburgh, Berlin, and Leyden, and succeeded his father in the chair of Anatomy, and as secretary of the Royal Society of Edinburgh. He published works on the nervous system (1783), on the physiology of fishes (1785), and on the brain, the eye, and the ear (1797).—He again was succeeded by his son, ALEXANDER MONRO, *tertius* (1773–1859), who wrote on hernia, and on the stomach, and an *Anatomy of the Human Body* (4 vols. 1813).

Monroe, a city of Michigan, on the Raisin River, 2 miles by a ship-canal from Lake Erie, and 40 miles by rail SSW. of Detroit. It contains a number of flour-mills, a woollen-mill, and other manufactories. Pop. (1884) 5281.

Monroe, JAMES, fifth president of the United States, was born in Westmoreland county, Virginia, April 28, 1758, the descendant of a family

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of Scottish extraction which had emigrated to Virginia a century before. He entered William and Mary College at the age of eighteen, but soon threw aside his books, with a number of his fellow-students, to join the army under Washington. He was present at several battles, and was wounded at Trenton; he afterwards attained the rank of lieutenant-colonel as an aide-de-camp and military commissioner, but was disappointed in his efforts to obtain a commission in a Virginia regiment, and attached himself to Jefferson, with whom he studied law. In 1782 he was elected to the assembly of Virginia and appointed one of the executive council. Next year he was returned to congress, where he sat for three years, and in 1785 was chairman of a committee whose report ultimately led to the conventions at Annapolis and Philadelphia in 1786 and 1787, at which the constitution of the United States was framed. Monroe himself was a member of the Virginia convention held to consider the ratification of the proposed constitution, which, along with Patrick Henry and other States' Rights men, he opposed, fearing the power and encroachment of the Federal government. He was a member of the United States senate from 1790 to 1794, and offered a determined opposition to Washington and the Federalists; yet the government appointed him to succeed Gouverneur Morris as minister to France, where he made himself very popular with the revolutionary government, until he was recalled in 1796 for displaying too decided French sympathies. On his return he published (1797) an attack on the executive for their treatment of him, and, although Washington himself, who had then retired, took no notice of it, the book brought on a bitter controversy and made Monroe the darling of the Democrats. He was governor of Virginia from 1799 to 1802, and then Jefferson sent him as an extra plenipotentiary to France, where in 1803 he and Robert R Livingston effected the purchase of Louisiana (q.v.). The next four years were spent in less successful diplomacy at London and Madrid; he failed in his negotiations with Spain for the cession of Florida, whilst a treaty which he finally concluded with Great Britain provided neither against the impressment of American seamen nor for an indemnity for American losses by seizures at sea, and Jefferson refused to refer it to the senate. Monroe promptly returned home and drew up another defence, and the Virginians endorsed his conduct and policy by a third time electing him to the assembly. In 1811 he was again chosen governor of Virginia. In the same year Madison made him secretary of state; this post he retained till 1817, and during 1814–15 he acted also as secretary of war.

In 1816 Monroe was elected president of the United States, and four years later he was re-elected almost unanimously; the acquisition of Florida from Spain (1819), and the settlement of the vexed question respecting the extension of slavery by the Missouri Compromise, by which, after the reception of Missouri as a slave-state, the institution was prohibited above the line of latitude 36° 30′, helped to secure this result. His most popular acts, perhaps, were the recognition of the independence of the Spanish American republics, and the promulgation in a message to congress (1823) of what has since been called the 'Monroe Doctrine.' This utterance embodied the principle, 'in which the rights and interests of the United States are involved, that the American continents . . . are henceforth not to be considered as subjects for future colonisation by any European power. . . . With the existing colonies or dependencies of any European power we have not interfered, and shall not interfere. But with the governments who have declared their independence and maintained it, and whose independence we have . . . acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition towards the United States.' In 1825 Monroe retired to his seat at Oak Hill, Loudon county, Virginia, where he acted as justice of the peace, a regent of the university of Virginia, and member of the state convention; but a profuse generosity and hospitality caused him to be overwhelmed with debt, and he found refuge with his relations in New York, where he died in 1831—like his predecessors, Adams and Jefferson, on the 4th of July. In 1858 his remains were removed to Richmond. Monroe was an upright and consistent statesman, and a faithful servant of his country, though he had not the brilliant talents of some of his great contemporaries.

See the Lives by John Quincy Adams (1850) and Daniel C. Gilman (in 'American Statesmen' series, 1883); also G. F. Tucker's *Concise History of the Monroe Doctrine* (Boston, 1885).

Monrovia. See LIBERIA.

Mons (Flem. *Bergen*), the capital of the Belgian province of Hainault, on the Trouille, 38 miles SSW. of Brussels. Its fortifications, renewed and strengthened since 1818, were demolished in 1862; but the country around can be laid under water. The Canal de Condé connects Mons with the Scheldt. The church of St Waudru (1450–1589) is a masterpiece of Gothic; and there are a town-hall (1458), a belfry (1662) 275 feet high, a good library, &c. The manufactures include woollen and cotton goods, cutlery, and sugar; whilst the vicinity forms an extensive coalfield. Pop. (1875) 24,539; (1889) 26,056. Mons, occupying the site of one of Cæsar's camps, was made the capital of Hainault by Charlemagne in 804. France, Spain, and Austria often contended for its possession. See Boussu's *Histoire de Mons* (2 vols. 1868).

Monsignore, a title of honour given to prelates of the Roman Catholic Church. Formerly in France the corresponding title of *Monseigneur* was allowed to all high dignitaries of the church, to the princes of the blood-royal, to the higher nobles, and to the presidents of the superior law-courts. But from the time of Louis XIV. Monseigneur without further addition was appropriated as the title of the Dauphin.

Monsoon is derived from the Arabic *Mausim*, 'a set time,' 'season,' and was for long applied to those winds prevailing in the Indian Ocean which blow from the south-west from April to October, and from the opposite direction, or north-east, from October to April. The monsoons, in common with all winds whether regular or irregular, depend primarily on an unequal distribution of temperature and moisture over that portion of the earth's surface where they occur, which in their turn give rise to an unequal distribution of atmospheric pressure. From this unequal distribution of the mass of the earth's atmosphere winds take their rise—winds being simply the flow of the air from a region of higher towards a region of lower pressure, or from where there is a surplus to where there is a deficiency of air. The term monsoon has in recent years come to be used with a wider significance than formerly; it is now generally applied to the winds connected with all continents which are of regular occurrence with the periodical return of the seasons. The winds of Australia are thus strictly monsoonal; over the greater part of North America the prevailing winds have a well-marked monsoonal character; similarly, monsoons

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occur on the coasts of Brazil, Peru, North Africa, and all other regions that happen to lie between regions whose temperature, and necessarily their pressures also, differ markedly from each other at different times of the year. See WINDS.

Monstrance (Lat. *monstrare*, 'to show'), called also OSTENSORY, the sacred utensil employed in the Catholic Church for the purpose of presenting the consecrated host for the adoration of the people, as well while it is carried in procession as when it is exposed upon the altar on occasions of special solemnity and prayer. It consists of two parts, the foot or stand upon which it rests, and the repository or case in which the host is exhibited. The latter contains a small semi-circular holder called the *lunula*, or crescent, in which the host is fixed; and it appears anciently to have been of a cylindrical or tower-shaped form, in the central portion of which, consisting of a glass or crystal cylinder, the host was placed. At present it is more commonly in the form of a star or sun with rays, the central portion of which is of glass or crystal, and serves to permit the host to be seen. This portion, or at least the crescent, is of gold or of silver gilt; the rest is generally of the precious metals, or at least gilt or silvered, although the lower portion is occasionally of bronze artistically wrought.

Monstrance.

Monstrosity is the term applied in human and comparative anatomy to an aberrant formation of the body consequent upon early disturbances in the developmental processes in the embryo. Teratology (*teras, logos*), the special and very interesting branch of biology which deals with the causes of such occurrences and with the classification of the 'monsters' so produced, has been advanced by the researches of Geoffroy Saint-Hilaire, Förster, and others to the position of a special science, and one that throws a valuable sidelight on that of normal embryology. The malformations to be dealt with may affect the whole organism or portions only of its structure. Monsters are, however, usually classified under three headings: (1) Those with exaggerated or supernumerary parts (*monstra per excessum*); (2) those lacking parts (*monstra per defectum*); and (3) those with abnormally arranged parts (*monstra per fabricam alienam*). Those of the first class, where supernumerary limbs or a double head or trunk exist, are generally recognised as due to the more or less complete fusion of two or more embryos, originally separate, during the process of development. Cases of this kind which have from time to time been carefully described, figured, or preserved in museums show that almost every possible degree of fusion of separate embryos may occur, resulting in a correspondingly great variety in the shapes of the monsters produced. Two otherwise complete bodies may be attached by an external bond, as in the case of the Siamese twins; or the one may be wholly or partially enclosed by the tissues of the other. A case of such complete inclusion is found in the Hunterian Museum. Much more frequently, however, but imperfect relics of the one remain attached to, or fused with, the fully-developed structures of the other. Thus arise two-headed monsters, those with double trunks or double sets of limbs, and those in which a shapeless mass representing the blighted embryo remains attached to the fully-formed body of the twin organism. In this same class of monsters by exaggeration must be placed also cases of general or local gigantic development, due not to fusion of separate embryos but to general or local precocity of growth in the tissues of a single organism. Not less interesting are monsters of the second class, where entire parts of the body may be suppressed during development. Here again it is shown that the non-development may occur in any region and to any extent: consequently numerous and widely separated varieties of monster are found in this class. The suppression of parts varies likewise in degree, and in its effect upon the viability of the organism. For instance, a headless or brainless monster is of necessity incapable of living; whereas one with suppression of a limb is viable, and might more properly be described as a case of congenital deformity. In the third class are the cases of transposition of viscera, malposition of limbs, congenital dislocations of joints, &c. See DEFORMITIES, CLUB-FOOT, and, for monstrosity in plants, TERATOLOGY.

Montagnana, a town of Northern Italy, 32 miles SW. of Padua. Pop. 3200.

Montagnards, or simply MONTAGNE, 'the Mountain,' the name given to the extreme democratic politicians in the first French Revolution, because they seated themselves on the highest benches of the hall in which the National Convention met. The body included both Jacobins and Cordeliers; its principal members were Danton, Marat, Robespierre, St Just, and Collot d'Herbois, the men of 'the Reign of Terror.' The antagonistic party were 'the Plain,' the Girondists (q.v.), who sat on the lowest benches, on the floor of the house. After the overthrow of the Girondists this part of the house was styled 'the Marsh or Swamp,' and included all the members whose votes were under the control of 'the Mountain.' In 1848 the extreme party in the National Assembly, composed of revolutionary democrats and communists, sometimes flattered itself by assuming the title of 'the Mountain.'

Montagu. The illustrious family of Montagu springs from Drogo de Montacute, who came from Normandy with the Conqueror. Sixth in descent from him was Simon de Montacute, grandfather of the William de Montacute created Earl of Salisbury in 1337, many of whose successors have been great historical personages. The subsequent family of Montagu descended from Simon (younger brother of the third Earl of Salisbury), who was the ancestor of Sir Edward Montagu, Speaker of the House of Commons and afterwards Lord Chief-justice, who died in 1557. His son, Sir Edward Montagu of Boughton, had six sons; Edward, the eldest, was made Baron Montagu of Boughton; and his grandson Ralph, third baron, was (1689) created Earl of Montagu, and in 1705 Duke of Montagu. In his son John the male line of the first Baron Montagu became extinct. The third son of Edward of Boughton was Sir Henry Montagu, the famous lawyer and orator, who was Lord Chief-justice, and created Lord Montagu of Kimbolton, and afterwards (*temp.* Charles I.) Earl of Manchester (q.v.). His son (second earl) was a general in the parliamentary army, who gained distinction by his victory over Prince Rupert at Marston Moor, but subsequently gave in his adhesion to Charles II. on his restoration. The fourth Earl of Manchester was

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an enthusiastic follower of William III., fighting with him at the battle of the Boyne, and taking part in the siege of Limerick; he was eventually created Duke of Manchester in 1719 by George I. His descendant, the eighth duke, succeeded in 1890. The sixth son of Edward of Boughton was Sir Sydney Montagu, whose son, Edward, was a considerable mathematician, and serving first in the army, then in the navy, became the first sole commander of the English navy, and was created by Charles II. Lord Montagu of St Neots, Viscount Hinchinbroke, and Earl of Sandwich. His descendant, the eighth earl, succeeded in 1884.

Montagu, LADY MARY WORTLEY, born about 1690 at Thoresby, Nottinghamshire, was the eldest daughter of Evelyn Pierrepont, Earl (afterwards Duke) of Kingston. She was a clever, attractive child, the pride and delight of her father, who, having lost his wife in 1694, and continuing a widower, introduced his daughter to society, and made her preside at his table at a very early age. When she was only eight years old he introduced her to the famous *Kit-Cat Club*, and she was formally admitted a member. In 1712 she married, without the consent of her father, Edward Wortley Montagu, eldest son of the Hon. Sydney Montagu, and grandson of the first Earl of Sandwich. For more than three years after her marriage she lived at Wharncliffe Lodge, near Sheffield, where her son was born, her husband during this time being kept principally in London by his parliamentary duties. On the accession of George I. Mr Montagu obtained a seat at the Treasury Board, and from this time Lady Mary lived in London, where she gained a brilliant reputation by her wit and beauty, and was on terms of intimate friendship with Addison and Pope, and other literary men of the day. In 1716 Mr Montagu was appointed ambassador to the Porte, and in August of that year he set out for Constantinople, accompanied by his wife. They remained abroad till 1718, and during this time Lady Mary wrote the well-known *Letters* to her sister, the Countess of Mar, Pope, and other friends. The *Letters* give a true description of Eastern life and manners, and are written in a clear, lively style, sparkling with wit and humour. While in Turkey she witnessed Inoculation (q.v.), and introduced it into England on her return, having so much faith in its safety that she tried it first on her own son. The next twenty years of her life she passed in England, and fixed her abode at Twickenham, where she renewed her intimacy with Pope, and then quarrelled with him, the immediate cause of the quarrel being the publication by Lady Mary of six satirical sketches entitled *Town Eclogues*. In 1739, for reasons which are not well known, she left England and her husband, from whom, however, she parted on very good terms, though they never met again. She lived in Italy, first on the shores of the Lake of Iseo, and afterwards at Venice till 1761, when, at the request of her daughter, the Countess of Bute, she returned to England. She died August 21, 1762. A collected edition of her works, with Life, was published by her great-grandson, Lord Wharncliffe (3 vols. 1837; 3d ed. 1887).

Montague, CHARLES. See HALIFAX (LORD).

Montaigne, MICHEL EYQUEM DE, was the third son of Pierre Eyquem, Seigneur de Montaigne. He was born in 1533 on the family estate in Perigord. His father had ideas of his own on the subject of education, and his third son was to have the full benefit of them. The first novel step was the putting of Michel out to nurse in a village on the estate, that he might be early inured to simple habits of living, and learn to sympathise with the lot of the poor. Whether or not the result of this early association, it is the fact that in his after life Montaigne always spoke of his poorer neighbours with a respect and kindliness of tone remarkable in the age and class to which he belonged. It was the received opinion at the period of Montaigne's childhood that no boy could grow into a creditable citizen without a severity of discipline which would now be called brutal terrorism. It was the distinctive feature of Pierre de Montaigne's system, however, that boyhood should be made as happy as parents and teachers could make it, and in the upbringing of his famous son he was even whimsically humane. Every morning he had the boy awaked by the sound of some musical instrument, because he had heard 'that it disturbs the tender brain of children to awake them suddenly.' As he wished to make his son a scholar, and Latin was, therefore, an indispensable acquisition, he had the idea of converting a task into a natural pleasure. Till the age of six the boy was taught to speak no language but Latin, his tutor (a German), his parents, and even the domestics addressing him in that language. The result was that in the conversational command of Latin Montaigne had from boyhood the advantage of the best scholars of the day. His father was less successful in a novel method he also adopted in having him taught Greek.

When Montaigne reached the age of six his father 'allowed himself to be won over to common opinion,' and sent him to a school in the neighbouring city of Bordeaux—the Collége de Guienne, then, he himself tells us, the best in all France. His father, who as a former mayor had considerable influence in the city, 'made several stipulations against the rules of colleges, though, all the same, it still remained a college.' At this school Montaigne remained for seven years, boarding in the rooms of his successive teachers, among whom were two scholars of European celebrity, George Buchanan and Marc-Antoine Muret. The course of study in the college was almost exclusively the reading of Latin authors, and in after life Montaigne affirmed that, so far as he could judge, all these years were lost.

As a third son he had to choose between law and the church—only the eldest having the privilege of wearing the sword. All his life Montaigne had an insuperable difficulty in making up his mind, and on this occasion his father saved him the trouble by setting him to the study of law. In what school he pursued his legal studies has not been discovered, all that we know of them being summed up in his own sentence—'While a child I was plunged up to the ears in law, and it succeeded.' From the age of thirteen to twenty-four Montaigne is almost lost sight of. Casual references in his *Essais* prove that during this period he was frequently in Paris, that he knew something of court life, and that he took his full share of its pleasures. His legal studies received their reward in his appointment as member of the Court of Aids in the district of Perigord; and in 1557, by the consolidation of this court with the Parlement of Bordeaux, Montaigne became a city counsellor. The office was an honourable one; but it was little to Montaigne's taste, who, in truth, is never weary of telling us that every form of restraint was against all his natural inclinations. It was during his tenure of this office, however, that he formed his famous friendship with Etienne de la Boëtie, a relation which he always regarded as the happiest and most memorable of his life. To Montaigne La Boëtie seemed in gifts of soul and intellect the equal of the greatest characters of antiquity. From the writings La Boëtie left behind him (a series of sonnets, and a political pamphlet advocating extreme republicanism), it seems probable that

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Montaigne exaggerated his friend's powers. However this may be, the memory of La Boëtie, who died at the age of thirty-two, was the one thought that never failed to raise Montaigne above himself, and that adds the one romantic touch to his epicurean temper.

Montaigne held the office of counsellor for about thirteen years; but of this period of his life, also, no definite history has been recovered. From incidental remarks of his own we gather that he was familiar with the court of Francis II., that he saw and greatly admired Mary Queen of Scots, and that at some time or other he was 'gentleman of the bedchamber in ordinary,' an office that did not necessitate residence at court. From Charles IX. he received the order of St Michel, instituted by Louis XI., and once a coveted honour, but in Montaigne's day somewhat faded in its lustre. At the age of thirty-four he married Françoise de la Chassaine, the daughter of one of his fellow-counsellors in Bordeaux, though in taking the step he assures us that he merely yielded to convention, as of his own inclination 'he would not have married Wisdom herself.' As the times went, Montaigne was a faithful and considerate husband; but he makes no secret that his wife held but a subordinate place in his thoughts. He lost 'two or three' children (the expression is his own) in their infancy, and was survived by one daughter, of whom, as he speaks little in his writings, it may be concluded that she was bound to him by no peculiar tie of affection. A year after his marriage, at the request of his father, he translated the *Natural History* of Raymond de Sebond, a Spaniard, who in the preceding century had professed theology, philosophy, and medicine at Toulouse. This translation is noteworthy as being Montaigne's first effort in literature, and as having afterwards supplied the text for one of his most famous essays, the *Apologie de Raymond Sebond*, in which he exhibits in all its bearings the full scope of his sceptical philosophy. Two years later he published certain literary remains of his friend La Boëtie.

In 1571, his two elder brothers being dead, Montaigne succeeded his father in the family estate, and here till his death in 1592 he lived the life of a country gentleman, varied only by a few visits to Paris, and by eighteen months' travel in Germany, Switzerland, and Italy. It was during this period that he achieved his immortality. Finding on his retirement to his château that some mental occupation was imperatively necessary to save him from morbid fancies, he began those *Essais* which were to give him a place among the first names in literary history. If we know few incidents regarding this period of his life, we have at least the minutest record of his entire surroundings, of his daily manner of life, of his tastes, his habits, his speculations and imaginings. In June 1580, partly on account of his health, and partly from his strong natural curiosity to know strange countries, he set out on the prolonged course of travel above mentioned. His record of this journey, dictated to his secretary, and partly written in his own hand in French and Italian, was discovered in his château, and first published in 1774. While at the baths of Lucca, the announcement came to him that he had been unanimously elected mayor of Bordeaux. In accordance with his distaste for practical life, he at first refused the appointment, but at the instance of his friends and on the command of Henry III. he withdrew his declinature. The office, which had been held by his father before him, was of high military as well as civil rank, his immediate predecessor having been the Duc de Biron, one of the marshals of France. In spite of his natural indolence and indecision, he must have performed his duties to the satisfaction of the citizens, as they did him the unusual honour of re-election. Of his last years the only circumstance deserving special record is his relation with Mademoiselle de Gournay, who won his heart by her enthusiastic admiration of his essays when she was only nineteen. After a meeting in Paris a romantic friendship sprang up between them, which lasted till Montaigne's death; and it is to Mademoiselle de Gournay, his *fille d'alliance*, as he called her, that we owe a valuable edition of his *Essais*, inscribed by her to Cardinal Richelieu in 1635. Montaigne in his later years suffered much from stone and gravel, but at the last he died of quinsy after a few days' illness in his sixtieth year, 13th September 1592. Notwithstanding the free expression of scepticism in his writings, he devoutly received the last offices of the church.

The conclusive attestation to Montaigne's varied power is the fact that three centuries after his death the circle of his readers widens every year, and that he has now almost as large a following of antiquaries as Shakespeare himself. Of his admirers in every generation it has also to be remarked that they are of all types of mind and creed, and that among them are found men like Pascal, who, while separated from him as by an abyss on all the fundamental problems of life, have acknowledged their debt to his fearless and all-questioning criticism. To have thus commanded the attention of the acutest intellects of every age since his own by haphazard remarks, devoid of all method, and seemingly inspired by the mere caprice of the moment, could be the privilege only of a mind of the highest originality, of the very broadest sympathies, and of a nature capable of embracing and realising the largest experience of life. In achieving this distinction, what are reckoned among his chief defects have doubtless stood him in as good stead as his merits. His inconclusive philosophy, his easy opinions on many points of morals, his imperfectly developed sense of duty, the total absence of any heroic strain in his nature, were but the necessary conditions of that general attitude towards men and things which make him the unique figure he is in the history of European literature.

There are two English translations of Montaigne, one by Florio (q.v.), which was used by Shakespeare, and another by Charles Cotton (q.v.), revised by Hazlitt (1865). See St John, *Life of Montaigne;* Lucas Collins, *Montaigne;* Emerson, *Representative Men;* Mark Pattison, *Essays* (1889); Dean Church, *Miscellaneous Essays* (1888); Alphonse Brun, *La Vie Publique de Michel Montaigne;* Payen, *Nouveaux Documents inédits ou peu connus sur Montaigne.* There are admirable editions of the *Essays* by Courbet and Royer (5 vols. 1873–91), and by Moutheau and Jouaust (7 vols. 1886–88).

Montalcino, a cathedral city of Central Italy, stands on a hill (1900 feet), 22 miles SSE. of Siena. Pop. 2353.

Montalembert, CHARLES FORBES RENÉ DE, born in London, May 15, 1810, was the eldest son of a noble French *émigré* and his English wife. His grandfather, Mr Forbes, a retired Indian merchant, living at Stanmore, near Harrow, had charge of him from an early age, as his father went back to France with the restored Bourbons and was rewarded for his zeal in their service by being named a peer of France and minister-plenipotentiary to Stuttgart. When Charles was eight years old he was sent to school at Fulham, but was there for a very short time, as the following year his grandfather died, and he went to his parents in Paris. He was fourteen when the head of the Collége St Barbe induced them to place him under a regular course of study. At sixteen he entered the college, and left it at nineteen to join his father, then ambassador at Stockholm. He returned to Paris in 1829, and during a period of uncertainty as to his future career occupied himself by writing an

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article upon Sweden, which appeared in the *Revue Française*. In 1830 he went to Ireland, and, returning full of enthusiasm for religious freedom, at once eagerly joined himself to the Abbé Lamennais and Lacordaire in their enterprise of the *Avenir*, the well-known High Church Liberal newspaper. In 1831 Montalembert and Lacordaire opened a free school in Paris, which was immediately closed by the police, and a prosecution commenced against the schoolmasters. The death of Montalembert's father at this time having raised him to the peerage, he appealed to be tried by his peers, and pleaded with great eloquence the cause of the church and the common interests of religious liberty. Though he was reprimanded and fined 100 francs, this defeat had the effect of a victory. In the same year the *Avenir* was temporarily suspended, and finally given up, being condemned by the pope. After this Montalembert for a time withdrew from France and lived in Germany, where he was inspired with the idea of writing the *History of St Elizabeth*, which was published in 1836. In 1835 he returned to Paris, and made his first speech as a member of the Chamber in defence of the liberty of the press.

He married a daughter of Count Felix de Mérode in 1836. The winter of 1842 he spent in Madeira for his wife's health, and while there wrote a pamphlet entitled *Devoir des Catholiques dans la Question d'Enseignement*, in which he protested against the monopoly of education by the French University, and pleaded for free education, or, in other words, religious education guaranteed by common liberty. For this cause he fought unweariedly in parliament till it was won. His protests against tyranny, however displayed, came to a climax in a great speech in January 1848 upon Switzerland. The Revolution took place a month later; and in April Montalembert was elected a member of the National Assembly. When the *coup d'état* of December occurred he supported Louis Napoleon till the confiscation of the Orleans property. Then he at once resigned his post as a member of the Consultative Commission, and became from henceforth a determined opponent of the imperial régime. He was elected to the Academy on February 5, 1852, and from that time occupied himself with literary work. After a visit to England in 1855, he wrote *L'Avenir politique de l'Angleterre*. Three years later he published an article in the *Correspondant*, called 'Un Debat sur l'Inde au Parlement Anglais,' in which he made such exasperating allusions to the imperial government that he was prosecuted and sentenced to six months' imprisonment and a fine of 3000 francs. The sentence was, however, remitted by the emperor. He published the two first volumes of his great work, *Les Moines d'Occident*, in 1860, and completed it in 1867. He also wrote *Une Nation en Deuil: la Pologne* (1861), *L'Église libre dans l'État libre* (1863), *Le Pape et la Pologne* (1864), &c. During the last ten years of his life he suffered from the malady of which he died in Paris on 13th March 1870, sixteen days after writing his celebrated letter on papal infallibility.

Montalembert was one of the best French orators of his day, a great statesman and author, an accomplished man of the world, and a devoted, noble-minded son of the church. He loved freedom more than all the world, and the Catholic religion more than freedom; and thus, while he fought all his life for freedom, in questions of faith he submitted his will and intelligence to the judgment of Rome. See the Memoir by Mrs Oliphant (2 vols. 1872).

Montana, one of the north-western states of the American Union, extends from 104° to 116° W. long., and from 44° 15′ to 49° N. lat., and is bounded N. by the Canadian provinces of Alberta and Assiniboia, E. by North and South Dakota, S. by Wyoming and Idaho, and W. by Idaho. In area—146,080 sq. m., or nearly five times the size of Scotland—it ranks third among all the states and territories, but in population only 44th: Delaware is 71 times less, and has one-fourth more inhabitants.

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The Rocky Mountains, with their subsidiary ranges, occupy fully one-fifth of the surface, in the south and west; the rest of the state is made up of valleys or high, rolling prairies, treeless, but yielding nutritious grasses. The head-waters of two of the largest rivers in North America—the Columbia and Missouri—have their sources in Montana. The mean elevation of the state is about 3000 feet; the average height of the Rocky Mountains—whose sides are covered with dense forests of pine, fir, and cedar—is about 6000 feet, while the highest peaks rise to 10,000 or 12,000 feet. The Yellowstone National Park (q.v.) forms part of the southern boundary of the state. In the south-east the Bad Lands extend into the state from Wyoming (q.v.). The climate of Montana is more moderate than that of the Dakotas and Minnesota, since the warm westerly winds prevail more than the north winds in winter here; there are but few excessively cold days, and, as there is little moisture in the air, the winters are less chilly and more exhilarating than in the east. The atmosphere is remarkable for its clearness, and cyclones are unknown.

The soil of Montana contains all that is needed for sustaining vegetation, but it is almost valueless without irrigation; with that, however, the yield of grains and vegetables is enormous. There are already hundreds of irrigating ditches within the state, and the federal government is locating storage reservoirs all along the Rocky Mountain range, to store water for this purpose from the melting snows in spring-time. It is calculated that 20,000,000 acres of land can thus be brought under cultivation. Placer mining being practically exhausted, a large part of the population has turned its attention to stock-raising, for which Montana is better suited than for agriculture. The prairies produce several varieties of bunch grass, which cures on the stalk in August, and retains all its nourishing qualities throughout the year; stock on the range receive no other feed, summer or winter, and very little shelter is required.

But the great industry of Montana is the mining and reduction of her gold, silver, lead, and copper ores. Her minerals first attracted emigration, and have hitherto been her principal wealth. The first systematic working of placer mines for gold commenced in 1862; in 1863 the first gold-quartz mill was built. According to the U.S. Treasury Reports, the total value of gold and silver produced in Montana from 1862 to and including 1889 was: gold, $178,589,421; silver, $108,992,319; total, $287,581,740. The annual value of the lead produced is over $1,000,000. The total yield of copper up to 1882 was 4044 long tons; in 1882–89 it was 215,992 tons. The value of these four metals in 1889 exceeded $40,000,000.

History.—The portion of Montana east of the Rocky Mountains was part of the Louisiana Purchase; that lying to the west formerly composed a part of Oregon and Washington states. It was first visited by the French in 1742–43, and by Lewis and Clarke in 1804–6; these were followed by fur-traders and trappers, and by Jesuit missionaries, who established schools for Indian boys and girls. Gold was discovered in 1861, and mining began in earnest the following year. In 1864 the territory was organised, and on 8th November 1889 Montana became a state of the Union. Education, for a frontier state, is well

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organised, and the exhaustion of the placer mines and the spread of railways have contributed to drive away the worst elements of the early population and replace them with industrious settlers. The chief towns include the capital, Helena (q.v.), Butte City (10,701), and Virginia City. Pop. (1870) 20,595; (1880) 39,159; (1890) 131,769, including some 1500 Chinese and 12,500 Indians. Troubles with the latter have been frequent: in 1876 General Custer (q.v.) and his command were all killed on the Little Big Horn by the Sioux.

Montanism, a heresy which grew up within the Christian church in the second half of the 2d century; its founder was Montanus, a religious enthusiast who appeared at Ardaban in Phrygia in the year 156, with a mission to purify and reorganise the church. Christianity had now become adopted by men in all classes, and already it had to a great extent ceased to be what it was originally—a society of enthusiastic devotees shut off from the world. At the same time the church adapted to her use everything of value in the social and political arrangements of the world around her, and thus fitted herself for the rôle of a great world-religion. Side by side with this growing secularism there sprung up a natural reaction in favour of the old discipline and severity, and nowhere was this so strong as in Phrygia, where it was linked with a belief in a new and final outpouring of the Spirit. Here there quickly formed themselves societies of *spiritual* Christians who gladly hailed the appearance of the 'Paraclete,' and were gradually compelled to withdraw from the church, branded as Montanists and Kataphrygians. Montanus selected the small Phrygian towns of Pepuza and Tymion as the Jerusalem of the church, and for twenty years his movement was limited to Phrygia and the surrounding district. He himself enjoyed a continuance of the prophetic gift, as well as the two women Prisca and Maximilla; his most zealous missionaries were Alcibiades and Theodotus. The persecution that began after the year 177 spread the movement wider by deepening the earnestness of conviction in those that held fast their faith. In Phrygia they were sternly repressed by the bishops, and formally excommunicated; but elsewhere than in Asia Minor they did not at once leave the church, but formed small conventicles within it. In Gaul and Rome it was long held that communion should be maintained with them. But gradually separation became necessary, as the Montanists became stronger in their demand for a return to primitive discipline, for more fasting, the prohibition of second marriages, and a severer life generally. Denunciation and exclusion produced their natural effect in making them still more narrow, severe in their judgments, and arrogant in their asceticism. At Carthage a numerous body of Montanists had grown up, and from 202 to 207 they strove hard, but in vain, to remain within the church, but at length quitted it because it refused to recognise the new outpouring of the Spirit. It was now that the great Tertullian joined their ranks, having become profoundly convinced of the necessity for a return to primitive Christianity in order to heal the secularism of the church. Montanism survived in the East till the 4th century; in the West it was ever less aggressive, and did not grow up until the Catholic Church had firmly established its organisation. Therefore it never became more than a mere sect; and from a genuine desire for reform and simplicity it degenerated into an artificial strictness and mere legalism. Yet down to 400 A.D. there were still Tertullianists at Carthage.

See Ritschl's *Entstehung der Altkatholischen Kirke* (2d ed. 1857); De Soyres, *Montanism and the Primitive Church* (1878); Bonwetsch, *Die Geschichte des Montanismus* (1881); Weizsäcker in *Theol. Lit.-Zeitung* (1882); and Harnack, *Das Mönchthum, seine Ideale und seine Geschichte* (2d ed. 1882).

Montargis, a town in the French department of Loiret, 47 miles E. by N. of Orleans, with a fine church (12th century—1868) and ruins of a vast castle, once 'le berceau des Enfans de France.' Here in 1371 is said to have occurred the famous judicial combat between 'the dog of Montargis' and Macaire its master's murderer. The dog not only showed the spot in the forest of Bondy where its dead master was buried, but singled out the murderer, and, when Charles VI. granted the ordeal of battle to test his guilt, the dog flew at his throat and so proved its charge upon his body. Pop. (1872) 8196; (1886) 10,984.

Montauban, the capital of the French department of Tarn-et-Garonne, on the river Tarn, 31 miles N. of Toulouse. A well-built, handsome place, it has a modernised brick bridge (1335), 224 yards long; a fine cathedral (1739) in the Italian style; and a monument (1871) to Ingres, the painter, a native. Besides considerable woollen manufactures, it carries on a great trade in wine, grain, leather, &c. Montauban was founded in 1144 by Count Alphonse of Toulouse, became the seat of a bishop in 1317, embraced the Reformation in 1560, and acquired historical celebrity as the great stronghold of the Huguenots, being vainly besieged for three months by De Luynes for Louis XIII. in 1621. It suffered much in the Dragonnades; but nearly half the inhabitants still are Protestants, and maintain a theological college. Pop. (1872) 18,855; (1886) 22,431.

Montbeliard (Ger. *Mömpelgard*), a town in the French department of Doubs, 48 miles NE. of Besançon. It lies in a valley between the Vosges and Jura Mountains, is surmounted by an old château (now a prison), and carries on manufactures of watch-springs, watchmaking tools, and cotton. A possession of the House of Würtemberg from 1397, it was a Protestant centre from 1525, was formally ceded to France in 1801, and suffered much in the Franco-German war. Cuvier was a native; and there is a statue of him, as also of Colonel Denfert, the heroic defender of Belfort. Pop. (1872) 5865; (1886) 9055, mostly Lutherans.

Mont Blanc, the highest mountain in Europe (if we regard the Caucasus, q.v., as Asiatic), 15,782 feet above sea-level, is situated in France, close to the Italian frontier, 40 miles S. of the Lake of Geneva. The waters which spring from its western slopes are drained off to the Rhone, those which originate on the east side to the Po. It rises into several sharp peaks (*aiguilles*) and forms great glaciers—the Glacier du Géant, Mer de Glace, &c. In 1760 Saussure offered a prize for the discovery of a practicable route to the summit of Mont Blanc, which was gained, in June 1786, by Balmat and Paccard, guides. Saussure himself ascended the mountain the following year; and since Albert Smith published a description of his ascent in 1851 the mountain has been ascended by several hundreds; indeed, more than fifty parties climb it annually. It has been the most conspicuous for accidents of all Alpine peaks; twenty-four persons had perished in accidents on it down to 1886. See *Chambers's Journal*, August 1886, and, for an illustration, see ALPS. There is an observatory (1890) at a height of 14,470 feet.

Montbrison, a French town in the department of Loire, 35 miles SW. of Lyons, with mineral wells and some ribbon manufacture. Pop. 6235.

Montcalm. Louis Joseph, Marquis de Montcalm Gezan de Saint Véran, was born in the château of Candiac, near Nîmes, 29th February 1712. At fifteen he entered the army. In 1746

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he was severely wounded and made prisoner at the battle of Piacenza. In 1756 he assumed command of the French troops in Canada, and soon after his arrival captured the British post of Oswego. The succeeding summer he crossed Lake George with about 8000 French and Indians, and captured Fort William Henry. After the French had taken possession of the fort, the defenceless prisoners, comprising men, women, and children, were massacred by the Indians. Montcalm has been blamed even by his apologists for not foreseeing the danger, and taking effectual measures to avert it. In 1758 General Abercromby advanced on Ticonderoga with 15,000 regulars and provincial troops. The place was defended by Montcalm with a much smaller force of regular troops. The British troops displayed heroic daring and courage, but after repeated attempts to force the defences, which were in themselves almost impregnable, and were defended with great gallantry, they withdrew with a loss of about two thousand men. This French success was, however, much more than counterbalanced by the loss of Louisburg and Fort Duquesne about the same time. Montcalm then removed to Quebec, and prepared to defend it against a British attack. Of the 16,000 troops under his command the majority were militia and Indians. In 1759 General Wolfe ascended the St Lawrence with about 8000 troops, and a naval force under Admiral Saunders. After repeated attempts to scale the heights of Montmorency, and a severe repulse about the end of July, he surprised a French outpost before dawn on 13th September, scaled the heights with about 5000 men, gained the plateau of Quebec, and formed in line of battle on the Plains of Abraham. In the battle that ensued the French ultimately broke in disorder and retreated on the city. Montcalm tried in vain to rally his force, and, having been borne back by the pressure of the retreat, he was mortally wounded at the St Louis gate, and died the following morning, 14th September 1759. See the article WOLFE; Parkman's *Montcalm and Wolfe* (Boston, 1884); and Falgairolle's *Montcalm devant la Posterité* (Paris, 1886).

Mont Cenis, or MONTE CENISIO, an Alpine peak and pass between Savoy and Piedmont. Height of the mountain, 11,792 feet; of the pass, 6884 feet. Over the pass a road was constructed (1802–10) by Fabbroni, under Napoleon's orders, at an expense of £300,000. Thirteen miles west of the pass a railway tunnel, 7½ miles long, was begun in 1857 on the Italian side, and in 1863 on the French, and was finished in 1870 at a cost of £3,000,000. Through this tunnel passes one of the main continental overland routes from London *viâ* Paris to Brindisi, for Asia, Australia, and East Africa.

Mont-de-Marsan, capital of the French department of Landes, at the confluence of the Midou and Douze, 92 miles by rail S. of Bordeaux. It has a mineral spring and manufactures of chemicals, iron, &c. Pop. (1872) 7441; (1886) 10,714.

Mont de Piété, called in Italy MONTE DI PIETÀ, a charitable institution the object of which is to lend money to the poor at a moderate rate of interest. It was closely modelled on the 'Monte,' a precursor of the modern bank, in which the creditors, or the parties who supplied the capital, formed a close corporation, with privileged claims upon certain sources of income. These conditions were designed to avoid the laws against usury. But the Monte di Pietà did not at first levy regular interest, only a small percentage to cover the expenses of administration. The earliest of these institutions was established at Orvieto in 1463; and another followed at Perugia, 1467; yet the right to levy for the expenses of management was only conceded in 1515. The system was introduced in Spain, France, Belgium, Germany, the Netherlands, and Mexico. There exists at Paris a national pawnbroking establishment, called Mont de Piété, which charges 9 per cent. on all loans to pay the working expenses. The surplus gain is handed over to the public charity funds. See Blaize, *Des Monts de Piété* (2 vols. 1856), and PAWNBROKING.

Mont-Dore-les-Bains, a village of Auvergne, in the department of Puy de Dôme, 26 miles SSW. of Clermont-Ferrand. It lies 3412 feet above the sea-level, in a picturesque valley, through which the river Dordogne flows, and which is bordered on both sides by rugged volcanic hills, and closed towards the south by a semicircle of jagged mountains, the highest point of which, the Pic de Sancy (6188 feet), is the loftiest mountain in central France. The Mont Dore mineral springs, which were used by the Romans, are of great value in affections of the throat and most diseases of the respiratory organs, as also in the earlier stages of rheumatism. There are eight powerful springs in full operation, seven of these having a temperature which varies between 102° and 114°, while La Source Sainte Marguerite is comparatively cold. The water contains bicarbonates of soda, iron, and arsenic. The ordinary population of the village is about 1400, but the baths, which are every year becoming better known, are thronged during the short season (July to September) with visitors from all parts.

Montebello Casteggio, a village of Northern Italy, 14 miles S. by W. of Pavia, where the Austrians were defeated by a French army under General Lannes (afterwards Duke of Montebello), after a desperate conflict, 9th June 1800. In May 1859 the Austrians were again defeated here by the united French and Piedmontese army.

Monte Carlo, a small town in the territory of Monaco (q.v.), 1 mile NE. of the town of Monaco, notorious on account of its gaming-tables, and the numerous suicides of ruined gamblers.

Monte-Casino, the monastery built (529) by St Benedict, founder of the great Benedictine order, stands on beetling cliffs, in a magnificent situation, 70 miles by rail NW. of Naples and 92 SE. of Rome. It has been four times destroyed—in 589 by the Longobards, in 884 by the Saracens, in 1030 by the Normans, and in 1349 by an earthquake. It was dissolved in 1866; but a few monks still remain. In 1313 the abbot was elevated to episcopal rank, and from 1504 he was official 'head of all the abbots of the Benedictine order.' The existing church, replacing one erected in 1066, was built in 1727, and possesses an 11th-century Byzantine bronze portal, mosaics, frescoes, carvings, &c. The former monastic buildings contain valuable archives, a picture-gallery, a library of 40,000 volumes, 30,000 charts, 500 incunabula, and a seminary. See Tosti, *Storia della Badia di Monte Cassino* (1843), *Archivio Cassinese* (1847), and Mackey's *Life of Bishop Forbes* (1888).

Monte Catini, a watering-place of Italy, by rail 30 miles NW. of Florence and 19 E. of Lucca. Its mineral springs are saline, range between 82° and 86° F., and are efficacious for abdominal complaints, scrofula, and dysentery. The season lasts from May to September. Near here the Florentines were defeated by the Pisans in 1315.

Monte Cristo, an uninhabited islet of granite off the Italian coast, 26 miles S. of Elba. For the novel whose hero bears this name, see DUMAS.

Montecu'culi, RAIMONDO, COUNT, was born at Modena in 1608, and entered the Austrian service, distinguishing himself during the Thirty Years' War (especially at Breitenfeld and Nördlingen), in

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a campaign against the Turks (1664), and against the French under Turenne on the Rhine (1672–75). He was made a Prince of the Empire and Duke of Melfi, and died at Linz, 16th October 1681. A second edition of his *Opere Complete* appeared in 1823; there is a Life by Campori (1876).

Montefiore, Sir Moses, a Jewish philanthropist, descendant of a wealthy family of bankers, was born in Leghorn, October 24, 1784, where his parents happened to be sojourning. His grandparents had emigrated from Leghorn to London in 1750. In 1812 he married Judith Cohen (1784–1862), a lady who went hand in hand with him in all his many schemes of philanthropy. As a stockbroker he soon achieved great success. In 1818 he was elected president of the Spanish and Portuguese community. From 1829 onwards he took a prominent part in the struggle for removing the civil disabilities of English Jews (see Jews). In 1835 he was one of the parties to the contract for the £15,000,000 given as compensation to the slave-owners. He was for a time High Sheriff of Kent, and, after long exclusion and repeated re-election, was legally admitted as Sheriff of London in 1837. In that year he was knighted, and in 1846 was raised to a baronetcy in recognition of his meritorious public services. He distinguished himself by his practical sympathy with his oppressed countrymen in various parts of the East, chiefly in Poland, Russia, Roumania, and Damascus. He made seven journeys to the East, the first being in 1827 and the latest in 1874, chiefly for the amelioration of the condition of his countrymen. At Bucharest, during an anti-Jewish ferment, he boldly faced the mob at the risk of his life. He was presented with the freedom of the City of London in 1873, and an address in 1883. In memory of his wife he endowed a Jewish college at Ramsgate in 1865. In his hundredth year he was still hale and well, but died 29th July 1885. See *Diaries of Sir Moses and Lady Montefiore* (2 vols. 1890).

Montego Bay, a port on the north coast of Jamaica (q.v.).

Montégut, Émile, a clever French critic, was born at Limoges, June 24, 1826, and early made a reputation by a series of brilliant studies on English literature. He contributed to the *Revue*, the *Moniteur Universel*, the *Revue des Deux Mondes*, and other journals, and has published books of travel, a study of Marshal Davoût, and translations of Shakespeare, Macaulay's History, and Emerson's Essays. Books of altogether exceptional value in their critical insight are *Poètes et Artistes de l'Italie* (1881); *Types Littéraires, et Fantaisies Esthétiques* (1882); *Essais sur la Littérature Anglaise* (1883); *Nos Morts contemporains; Les Écrivains modernes de l'Angleterre* (2 vols.); *Livres et Âmes des Pays d'Orient; Mélanges critiques;* and *Dramaturges et Romanciers* (1890).

Montélimar, a town in the French department of Drôme, near the Rhone, 85 miles S. of Lyons by rail, with some manufactures of silk, hats, and morocco leather. Pop. 9445.

Montem. See Eton.

Montenegro (the Italian translation of the native name *Czrnagora*, 'Black Mountain'), an independent state in the Balkan Peninsula, between Herzegovina and Albania, about 80 miles long by 70 broad. Its area was extended in 1878 by the addition of a large district on the north, a long narrow strip right down its east side to Lake Scutari, and the port and district of Antivari on the south, on the Adriatic, and again in 1880 by the addition of the port and district of Dulcigno, also on the Adriatic. The area, thus extended, is officially quoted as 3255 sq. m.—a private estimate is 3486 sq. m.—considerably less than half the size of Wales. Beyond the low coastal fringe, which has a climate like that of the south of France, comes a rugged mountain-region ranging up to 6500–8000 feet, not in a series of chains, but in a confusing maze of peaks and gigantic crags and blocks, wild ravines and gorges, fissures and natural caves, the bare gray crystalline rock being everywhere visible. In this region the streams in some cases have underground channels, and even pass for miles beneath the mountains. The centre of the country is occupied by the branching valleys of the rivers Zeta and Moratcha, which flow south into Lake Scutari. East and north of them the mountains are well wooded, principally with beech and pine, and afford good pasturage to the sheep, goats, and cattle of the people. The climate in these mountainous regions is characterised by temperate heat in summer and a rigid winter. Comparatively little of the surface is cultivated, except in the coast region; it is too sterile. Yet agriculture is the principal occupation of the people; of industry there is virtually none. All the farms are small, the fields often patches of soil a few square yards in extent clinging to the mountain-side. The land in most cases belongs to the family, not to the individual, and woods and pastures are common to the clan. Maize, rye, oats, barley, potatoes, capsicums, tobacco, with fruits in the south, are the more important products. Wine for home consumption is grown on the shores of Lake Scutari; and the mulberry is cultivated for silkworms. The same lake, and some of the rivers flowing into it, yield an abundance of fish, especially of scorantza or bleak. The exports, consisting chiefly of cattle, goats, hides, smoked fish and mutton, cheese, sumach, fruits, and wine, reach the annual value of £200,000. The imports, for the most part wheat, gunpowder, hardware, groceries, cloth, and glass, average in value about one-tenth of the exports. Nearly all the trade is in the hands of the Austrians, and passes through their port of Cattaro. Good roads connect the chief towns or villages in the south; bridle-paths and footpaths only exist in the rest of the country.

The Montenegrins, a race of primitive mountaineers, whose principal business in life has for generations been to fight the Turks, are a brave, warlike, and simple people, noted for their honesty and their chastity. The men are stalwart and handsome, but the women, who until recent years did all the hard work whilst the men fought, or idled, or hunted, soon grow old and lose their good looks. The people live in small stone houses, in small villages—there is not a town, strictly so called, in all Montenegro. They belong to the Servian branch of the Slavs, number (1890) 236,000, and belong, except about 10,000 Mohammedans and 4000 Roman Catholics, to the Greek Orthodox Church, the head of which is the emperor of Russia. The native head of the church is the Archbishop of Cetinje. The monastery of Ostrog is visited by large numbers of pilgrims every year. There is a Roman Catholic archbishop at Antivari. In the 14th century the country, known as the principality of Zeta, was tributary to the Servian empire; but, when the latter was subjugated by the Turks (1389), Zeta, assisted by fugitive Servians, successfully maintained its independence. From that time down to 1880 the Montenegrins have waged almost incessant war against their hereditary foes, the Turks. In 1516, when the last prince of the second native dynasty abdicated his throne, the people elected their bishop to be ruler over them; and the little state was governed by ecclesiastical princes (vladikas) down to 1851, when Danilo I. of the Nyegush clan, and nephew of the last vladika, persuaded the people to separate the civil from the

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ecclesiastical functions, and to elect him their secular prince, and declare the throne hereditary in his family. The prince is an absolute sovereign; but he is assisted by a state council and a ministry of six members. The government both of the country and of the family is really, however, patriarchal, the will of the prince deciding all things only in so far as it does not conflict with the will of the people. During the last quarter of the 19th century the little land has progressed greatly in civilisation; education has made rapid strides, the men have taken to cultivating their fields, and roads have been constructed; while the old militia has been converted into a standing army of 30,000 men, though not more than 100 serve permanently, as a bodyguard to the prince. An arms-factory has been established at Rieka and ammunition-factories at Rieka and Cetinje. The last-named village is the capital. The empress of Russia supports a higher school for girls at Cetinje. Crime is almost unknown. Podgoritza and Rieka are the chief trading-places. The state income amounts to about £60,000 per annum, a portion of which is a subsidy from Russia (since 1856); the expenditure is not known. There is a state debt of £100,000 owing to Austria and £70,000 owing to Russia. Montenegro has no money of her own; she uses chiefly Austrian paper and Turkish silver. The vladika Peter II. (1830–51) is accounted one of the greatest poets who have written in Servian. In their patriotic songs and ballads the Montenegrins possess a treasure of great value, and of great influence upon the national temperament. The first Slavonic books to be printed were issued from presses at Cetinje and Rieka in the end of the 15th century.

See Denton, *Montenegro* (1877), where earlier books are referred to; E. A. Freeman in *Macmillan's Magazine* (1876); Gopcevic, *Montenegro und die Montenegriner* (1877); Schwarz, *Montenegro* (in German, 1882); W. Carr, *Montenegro* (Stanhope Essay, 1884); and H. C. Brown, *A Winter in Albania* (1888).

Montenotte, a small village of Northern Italy, 26 miles W. of Genoa, where Napoleon won his first victory over the Austrians, on 12th April 1796.

Montepulciano, a town of Italy, a bishop's see, situated on a high hill, 43 miles by rail SE. of Siena. It was the birthplace of Politian and Bellarmine, and is famous for its red wine. Pop. 2952.

Montereau, a town in the French department of Seine-et-Marne, at the confluence of the Seine and Yonne, 49 miles SE. of Paris. At the bridge here, in 1419, Jean-sans-Peur, Duke of Burgundy, was assassinated in the presence of the young Dauphin, afterwards Charles VII.; and in the immediate vicinity Napoleon, on February 18, 1814, gained his last victory over the allies. Pop. 7519.

Monterey, capital of the Mexican state of Nuevo Leon, lies in a fertile plateau-valley, by rail 670 miles N. of Mexico city. It is a well-built town, with a thriving trade, and contains a cathedral, seminary, and schools of law and medicine. Pop. 16,000. Founded in 1599, it was taken by General Taylor in 1846.

Monte Rosa, an Alpine mountain mass with four principal peaks, in the Pennine ridge which separates the Swiss canton of Valais from Italy. The highest peak, the Dufourspitze, 15,217 feet high, is extremely difficult of ascent, and was first climbed by Mr Smyth in 1855.

Monte Sant' Angelo, a city of Southern Italy, 28 miles NE. of Foggia. It stands 2790 feet above sea-level, on one of the Gargano hills, and is famed for its exquisite honey. Pop. 15,109.

Monte Sarchio, a town of Southern Italy, 13 miles NW. of Avellino. Pop. 5238.

Montespan, FRANÇOISE ATHÉNAIS, MARQUISE DE, mistress of Louis XIV., was born in 1641, the daughter of Gabriel de Rochechouart, Duc de Mortemart, and married in 1663 the Marquis de Montespan, and became attached to the household of the queen. Her beauty and wit captivated the heart of the king, and about 1668 she became his mistress, without, however, as yet supplanting La Vallière. The marquis was flung into the Bastille, next banished to his estates, and finally in 1676 his marriage was formally annulled. Montespan reigned till 1682, and bore the king eight children, which were legitimised, but at last her influence paled before the rising star of the astute widow of Scarron, afterwards Madame de Maintenon, whom she had engaged as governess to her children. Gradually she lost all hold over the king, and in 1687 left the court, in 1691 Paris itself. Later, like so many women of her class, she found relief in devotion, and died 27th May 1707. See her *Mémoires* (2 vols. 1829), and the studies by A. Houssaye (6th ed. 1864) and Clément (1868).

Montesquieu, CHARLES DE SECONDAT, BARON DE LA BRÈDE ET DE, a celebrated French writer on politics and law, was born 18th January 1689, at the château La Brède, near Bordeaux. Jacques de Secondat, the father of the future author, was second son of the Baron de Montesquieu, president and chief-justice of the parliament of Guienne. Charles-Louis de la Brède, as Montesquieu was called, after studying the ancient classics, philosophy, and law, became councillor of the parliament of Bordeaux in 1714, and its president in 1716, succeeding his uncle, who left him all his property on condition of his assuming the name and title of Montesquieu. The young president discharged the duties of his office faithfully, but he gave himself by preference to the study of nature under the influence of Newton. In his discourses before the Academy of Sciences of Bordeaux he dealt with the causes of echoes and of the weight and transparency of bodies, and with the use of the renal glands, and sketched a project of a physical history of the earth (*Discours Académiques*, 1716–21). But defective vision compelled him to abandon experimental research. His first great literary success was the publication of his *Lettres Persanes* in 1721. These contain a satirical description of the contemporary manners, customs, and institutions of society in France, and owed much of their popularity to the ingenuity of their form and the piquancy of their style. Two Persians, Rica and Usbek, are represented as coming from Persia to Paris, and exchanging their impressions by letters to each other, as well as corresponding with their friends at home. The idea was borrowed from Dufresny, and it has been frequently imitated since. The libertinage, the political decadence, and the irreligious insincerity of the first years of the regency that followed the death of Louis XIV. are limned with masterly art. For his delineations of Persian manners and institutions he drew from the accounts of Sir John Chardin and other travellers; but his vivid, and at times wantonly sensuous, imagination created most of his situations and characters. Along with much that is frivolous and ephemeral, the *Persian Letters* contain solid reflections on the nature and relations of social institutions, and an adumbration of the author's later views on government, toleration, and the influence of climate on population, customs, and religion. In 1725 Montesquieu wrote and published anonymously at Paris a prose poem entitled *Le Temple de Gnide*, in the artificial French style of the time. Returning to Bordeaux, he read to the Academy a treatise on duty from the Stoic standpoint, and delivered an admirable discourse on the motives which ought to give

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encouragement in the sciences (1725). Eager for larger observation and enjoyment of the life of society, and weary of the routine of his parliamentary duty, he sold his office in 1726, and then settled in Paris. Thereafter he travelled for three years in order to observe and study the political and social institutions of other countries. He visited Vienna, where he studied the constitutions of Hungary and Poland; Venice, where he formed a close friendship with Lord Chesterfield; and Rome, where he studied Italian art, and was favourably received by the pope. He then passed by Switzerland and the Rhine to Holland, where he again met Chesterfield, who took him to England. He remained in England from October 1729 to August 1731, mixing with its best society, frequenting the Houses of Parliament, studying the political writings of Locke, and analysing the organisation and working of the English constitution, whose essential principles he may be said to have discovered. After returning to France he divided his time between Paris and La Brède, mingling the pursuit of pleasure and an unostentatious charity with the preparation of his great works on the science of politics and law.

His *Considérations sur les Causes de la Grandeur des Romains et de leur Décadence*, the ablest, if not the most important, of his works, appeared in 1734. In it he surveys the vast political development of ancient Rome from the rude beginnings of the Eternal City till the Turks gathered around the walls of Constantinople, and his elucidation of the causes that determined the character and detail of the movement may be regarded as the first genuine application of the modern scientific spirit to history, and as an enduring contribution to its philosophy. His characterisations of the great Romans, his analysis of complex influences, his filiation of events, his estimates of political and social causation have been generally accepted and reproduced by subsequent historians. His great monumental work on the spirit of laws, *De l'Esprit des Lois*, appeared in 1748 in 2 vols. at Geneva. It was the product of all the work of his life, and of the deliberate and concentrated effort of twenty years. Although published anonymously and put on the Index, the work passed through twenty-two editions in less than two years; and it soon vindicated its claim to be the most original and popular book ever published on the science of law. Montesquieu indicated his consciousness of its originality by prefixing to it the epigraph: *Prolem sine matre creatam*. French Jurists of the 16th century, Cujas and others, had led the way to the historical treatment of Roman law, and Domat had written a chapter on 'the nature and spirit of laws,' but the universalisation of the historical and comparative method in dealing with the reason and relations of all laws is Montesquieu's own, and he applies it more lucidly, and also more widely than Vico did. By the spirit of laws he means their *raison d'être* in time, their historical causation, or the natural and social conditions by which their origination, development, and forms are determined. The discussion of the influence of climate was the most characteristic element of the work; it advances beyond the old abstract discussions of right, and, although pushed in some points too exclusively, it formed the prelude to all the more recent work of the positive and ethnological school. The analysis of the forms and principles of government carried the subject farther than had been done by any one since Aristotle; and the exposition of the constitutional government of England, with its clear distinction of the legislative and executive powers, made an advance upon Locke, and held up the free English constitution to the admiration and imitation of all Europe. The influence of Montesquieu's great work upon political and legal thought directly, and upon government and laws indirectly, was immense. It came too late to save France from the political errors that culminated in the Revolution, but it inspired and guided its best thinkers and its greatest men. In 1750 he published a clever *Défense de l'Esprit des Lois*, followed afterwards by *Lysimaque* (1748), a striking dialogue on despotism, *Arsace et Isménie*, a romance, and an essay on taste in the *Encyclopédie*. Severe study had exhausted his energy and still further weakened his eyes till he became totally blind. He died at Paris 10th February 1755, aged sixty-six, in the calm enjoyment of his great reputation.

The best edition of Montesquieu's works is that of E. Laboulaye (7 vols. Paris, 1875–79); that of Lahure (3 vols. 1856) is convenient and serviceable. There are English and other translations of the *Lettres Persanes*, and a commentary by Meyer (1841). The *Spirit of Laws* was soon translated into English by T. Nugent (new ed. by Prichard, with D'Alembert's Analysis, 2 vols. Bohn, 1878). Vian's *Histoire de Montesquieu, sa Vie et ses Œuvres* (2d ed. 1879) is the fullest biography and bibliography. The smaller monograph by A. Sorel (Eng. ed. by G. Masson, 1887) is excellent; that by Zevort (1887) may also be mentioned.

Monteverde, CLAUDIO, composer and harmonist (1568–1643). See HARMONY, MUSIC.

Montevideo, the capital of the republic of Uruguay, is situated on the north shore of the La Plata estuary, about 125 miles E. by S. of Buenos Ayres. It was built originally on a low promontory between the ocean and a horseshoe-shaped bay, 2 miles across; but its extensive suburbs now stretch far into the flat country behind, and have crept round the bay to the landmark which gives the city its name—the Cerro, a smooth, isolated cone, 505 feet high, crowned with a lighthouse and an old fort. At its base there are nearly a score of great *saladeros*, or beef-salting establishments, where 200,000 cattle yearly are killed; and here, too, is the largest of the city's dry-docks. The city proper covers an area of about 5 square miles, the old town, on the little peninsula occupying nearly one square mile; and the sea-breezes make its climate both pleasant and healthy. Montevideo is an attractive town, with broad streets exceptionally well paved—Mulhall declares the Calle 18 de Julio, which is 85 feet wide, 'incomparably the finest street in South America.' The houses are flat-roofed, mostly of two or three stories, and often crowned with small square belvideres. High above these rises the cathedral (133 feet), with two side towers and a dome covered with green and blue and yellow tiles. The next most prominent building is the large opera-house; and others are the town-hall, the custom-house, the exchange, the Cabildo (law-courts and parliament house), the school of arts and trades, the university, the museum, the English and Basque churches, two convents, the Hospital de Caridad (330 beds) and the British hospital (60 beds), the extensive public markets, and several of the banks and hotels. Tramcars run in all directions—there are over 55 miles of lines; there are local electric lighting and telephone companies, and a submarine telephone to Buenos Ayres; and water is brought by a pumping-main from the river Santa Lucia, a distance of 34 miles.

The depth of water in the bay ranges from 9 to 15 feet, and vessels of heavy draught are compelled to anchor in the roadstead outside, which is exposed and often very rough. If a proper port had been constructed in the years before 1864, when the Buenos Ayres trade was diverted by the Paraguayan war, Montevideo might have permanently taken the place now occupied by the Argentine

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capital; as it is, possessing the advantage of a large natural harbour, it may even yet become again a dangerous rival, should the necessary harbour-works ever be constructed. It has communication by steamer with the United States and Europe, and on five days a week with Buenos Ayres. Its foreign trade is that of Uruguay (q.v.). The manufactures are more numerous than important, but have increased of late years nearly as fast as the population. In 1877 there were 110,167 inhabitants, in 1889 there were 214,682; of these no less than 98,477, or nearly one-half, were foreigners. This foreign element—mainly drawn from Italy, France, and Spain, and engaged principally in retail trade—is a very noticeable feature of Montevideo life.—A fort was built on the Cerro, by the Spaniards, in 1717, and the first settlement of the town made in 1726; a century later (1828) it became the capital of the newly-formed republic of Banda Oriental. Its later history will be found under URUGUAY. See books on the river Plate by Mulhall (5th ed. 1885) and Levey (2d ed. 1890), and Vincent's *Around and About South America* (1890).

Montez, LOLA, adventuress, was born in 1818 at Limerick, and was christened Marie Dolores Eliza Rosanna, her father being an Ensign Gilbert, her mother of Spanish descent. Taken out to India, she there lost her father by cholera; and, her mother having remarried, Dolores (or 'Lola') was sent home in 1826 to Europe, and brought up at Montrose, in Paris, and at Bath. To escape the match, arranged by her mother, with a gouty old judge, she eloped with a Captain James, whom in July 1837 she married at Neath; but the marriage ended in a separation and in her return from India (1842). She now turned dancer, coming out at Her Majesty's Theatre; and after visits to Dresden, Berlin, Warsaw, St Petersburg, and Paris (where she formed a *liaison* with Dujarrier, a young Republican editor, who fell in a duel), she came towards the close of 1846 to Munich. There she soon won an ascendency over the eccentric artist-king, Louis I., who created her Countess of Landsfeld, and allowed her £5000 a year. For more than a twelvemonth she was all-powerful, her power directed in favour of Liberalism and against the Jesuits; but the revolution of 1848 sent her once more adrift on the world. Again she married (this time a Lieutenant Heald), a marriage as unlucky as the first; and, after touring (1851–56) through the States and Australia, and after two more 'marriages' in California, in 1858 she delivered in New York a series of lectures written for her by C. Chauncey Burr. She died, a penitent, at Astoria, Long Island, on 17th January 1861, her last four months devoted to ministering in a Magdalen asylum near New York, and was buried in Greenwood Cemetery. See her *Autobiography* (1858), and *The Story of a Penitent* (1867).

Montezuma, the name of two of the emperors of Mexico. Montezuma I., the most able of the Mexican emperors, ascended the throne about 1437, and soon after commenced a war with the neighbouring monarch of Chalco, which resulted in the annexation of that kingdom to Mexico. He next crushed a confederacy of the Tlascalans, and reigned safely till his death in 1471. Montezuma II., the last of the Mexican emperors, succeeded to the throne in 1502. Already distinguished as a warrior, henceforth he devoted his chief attention to the improvement of the laws, and indulged his taste for pomp and luxury at the cost of heavy taxation, leading to frequent revolts among his subjects. When Cortes landed in Mexico with his small army in 1519 Montezuma tried to buy off the dreaded enemy, but all his temporising could not prevent the conqueror's progress to his capital. Soon he himself was practically a prisoner in the Spanish camp, and when the citizens rose in revolt Cortes brought out Montezuma in order to pacify them; but an accidental wound from a stone flung from amongst the crowd of his own subjects proved a climax to all the indignities he had suffered. He repeatedly tore the bandages from his wound, and soon after died broken-hearted, June 30, 1520. Some of his children adopted the Christian religion, and his eldest son received from Charles V. the title of Count of Montezuma. One of his descendants was viceroy of Mexico from 1697 to 1701. His last descendant, Don Marsilio de Teruel, Count of Montezuma, was banished from Spain by Ferdinand VII., and afterwards from Mexico, on account of his liberal opinions, and died at New Orleans in 1836. See CORTES.

Montferrat, formerly an independent duchy of Italy, between Piedmont, Milan, and Genoa, now forming part of the kingdom of Italy. It consisted of two separate portions, both lying between the Maritime Alps and the Po, and having a united area of over 1300 sq. m. The capital was Casale. After the downfall of the Frankish empire, Montferrat was ruled by its own marquises till the beginning of the 14th century. This house sent its most illustrious sons to take part in the Crusades, especially Conrad, the defender of Tyre against Saladin, and the competitor with Guy de Lusignan for the crown of Jerusalem; and Boniface, who became ruler of Thessalia. Iolande or Irene, sister and heiress of the last male of the house, was empress of Constantinople; her second son became the founder of the family of Montferrat-Palæologus, which became extinct in 1533, and Montferrat then passed to the Gonzagas of Mantua. In 1631 the Dukes of Savoy obtained a portion of Montferrat, and in 1703 the remaining portion.

Montfort, L'AMAURI, the name of a noble French house, traditionally descended from a marriage (end of 10th century) between the heiress of Montfort and Epernon and William of Hainault, great-grandson of Baldwin, Count of Flanders, the third husband of Judith, daughter of Charles the Bald. The name was taken from the castle of Montfort between Paris and Chartres. Its most famous members were the great Simon de Montfort and his father, Simon IV., Comte de Montfort and Earl of Leicester, subsequently Comte de Toulouse, the ruthless persecutor of the Albigenses. He was born about the year 1160, went on a fruitless crusade to Palestine, but began about 1208 the more congenial crusade of extermination against the harmless heretics in the south of France. He was killed by a stone at the siege of Toulouse, 25th June 1218. See ALBIGENSES.

Montfort, SIMON DE, Earl of Leicester, the fourth son of the preceding, and of Alice de Montmorency, was born about the beginning of the 13th century. The title of Earl of Leicester came to him by his grandmother, Amicia de Beaumont, sister and co-heiress of Robert, Earl of Leicester; and in 1230 we find him in England, where he was well received by Henry III., and confirmed in his title and estates two years later. He married in 1238 the king's youngest sister Eleanor, who had been betrothed to the Earl of Pembroke, and who, in the grief of an enthusiastic girl of sixteen, at his death had taken in her haste a vow of perpetual chastity, but never proceeded to take the veil. The marriage aroused the jealousy of the barons and the denunciations of the church, whereupon Simon repaired to Rome, and there succeeded by gold in obtaining the pope's sanction. In June 1239 he was godfather at the baptism of Prince Edward, but three months later

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was denounced as an excommunicated man, and driven from his presence by the king. Simon crossed to France, but soon returned and was nominally reconciled. It is probable that he went on crusade to the Holy Land, but at anyrate he was again in England by 1242. We know but little of his life during the next six years, save that he lived the while at Kenilworth in intimate friendship with Robert Grosseteste, Bishop of Lincoln, and the learned Franciscan, Adam Marsh. Meantime the whole community was becoming exasperated by the misgovernment and faithlessness of the king, the extortionate exactions of the pope, and the fresh influxes of aliens on whom the court lavished its favours.

In 1248 Simon was sent as king's deputy to Gascony, and there he put down the prevalent disaffection with a heavy hand. But his jealous master listened eagerly to the complaints brought against his vigorous rule, and actually arraigned him before a special commission of inquiry, which only acquitted him after a lengthened trial. Earl Simon resigned his post in the winter of 1252–53, and returned to England, where he again comes into prominence in 1258 in the last act of the constitutional struggle. Bad harvests, famine, and fresh exactions of Rome, added to the rapacity of foreign parasites and protégés of the king, at length exhausted the endurance of the country, and in 1258 the barons appeared in arms at the parliament at Westminster, demanding the expulsion of all foreigners, and next the appointment of a committee of twenty-four—twelve from the king and twelve from the barons—to govern the realm. Later in the year the parliament met again at Oxford, and drew up the famous Provisions of Oxford, which the king swore solemnly to observe. A council of fifteen with a baronial majority was formed to advise the king; the old parliaments were superseded by a body of twelve chosen by the barons, to meet three times a year in order to transact business along with the fifteen; and foreigners were to surrender their castles—a self-denying ordinance in accordance with which Simon himself set the example by giving up Kenilworth and Odiham. This was almost entirely a baronial policy, and did little for the sub-tenants, with whom Prince Edward now began to intrigue for influence, whilst ere long breaches followed amongst the barons themselves, so that by 1261 the king felt strong enough to announce that the pope had declared the Provisions null and void. All men now looked to Earl Simon as leader of the barons and the whole nation alike, and he at once took up arms against the king. After some varying success, both sides agreed to submit to the arbitration of Louis IX. of France, who decided in the *Mise* of Amiens for an unconditional surrender to the royal authority. London and the Cinque Ports at once repudiated the agreement, and Simon hastily collected his forces, surprised the king's army at Lewes, and captured the young prince, May 24, 1264.

After his victory he arranged the *Mise* of Lewes, by which matters were anew to be submitted to arbitration. There were to be three electors, Earl Simon, the Earl of Gloucester, and the Bishop of Hereford, who were to appoint nine councillors to nominate the ministers of state. To aid these councillors in their task a parliament was called, in which, together with the barons, bishops, and abbots, there sat four chosen knights from each shire, and for the first time two representatives from certain towns. This was the fullest representation of England that had yet been convened, and may be looked upon as in a special sense the germ of our modern parliaments. But the great earl's constitution was premature; the barons soon began to be dissatisfied with the rule of Simon the Righteous, the arrogance of his sons injured his influence, and the young Earl of Gloucester abandoned him and went over to the king. Prince Edward, escaping from confinement by a stratagem, combined with Gloucester and fell with vastly superior force upon Simon at Evesham, and completely defeated him, August 4, 1265. The earl died upon the field, and his body was barbarously mutilated by Edward's soldiers, but the people and the native clergy, with the true instinct of a democracy, cherished him as a saint. His memory was enshrined in song and ballad, and miracles were ascribed to him long after his death.—The famous *Song of Lewes* is the most complete extant contemporary statement of the views of the constitutional party, of which Simon de Montfort was the champion and martyr. It was first printed by Thomas Wright in his *Political Songs* (1839) for the Camden Society, but a more adequate edition, furnished with introduction and notes, is that by C. L. Kingsford (Oxford, Clar. Press, 1890).

See Blaauw, *Barons' War* (1844; 2d ed. 1871); vol. ii. (1876) of Stubbs' *Constitutional History of England;* and the special Lives by Reinhold Pauli (1867; Eng. trans. by Una M. Goodwin, 1876), M. Creighton (1876), and especially G. W. Prothero (1877).

Montgolfier, JOSEPH MICHAEL (1740–1810), and JACQUES ÉTIENNE (1745–99), two brothers, the sons of a manufacturer at Annonay, distinguished as the inventors of the first kind of Balloons (q.v.).

Montgomerie, ALEXANDER, Scottish poet, was born most probably at Hessilhead Castle, near Beith, in Ayrshire, about 1545. He was related to the noble House of Eglinton, was first in the service of the Regent Morton, next of the king, and was awarded a pension of 500 merks a year. Traditionally he lived at Compston Castle, near Kirkcudbright, where enthusiastic readers have recognised the scenery of his principal poem. He travelled in France, Flanders, and Spain, was small in stature, given to drinking, and unhappy in his amours. He became devout in his later years, and was dead before 1615. Montgomerie had something of the tastes of the scholar, but his poems, especially the *Sonnets*, reveal a pitiful meanness and servility of character. His pasquinades are savage without being strong, his *Flyting between Montgomerie and Polwart* [Sir Patrick Hume] merely coarse, vulgar, and unclean. It is a war of words in feeble imitation of the famous piece of Dunbar. Montgomerie's miscellaneous poems are mostly amatory in character, and are laboured in style; his devotional poems are poor; but his fame rests securely on the *Cherrie and the Slae*, which at once leapt into popularity, and really contains fine work, in spite of Pinkerton. Its earlier portion is a love-piece; the later, a moral and didactic poem. Here at least there is real freshness and descriptive power, with dexterous mastery of rhyme. There are editions by Dr David Irving (1821), and Dr J. Cranstoun for the Scottish Text Society (1886–87).

Montgomery, the capital of Alabama, is on the left bank of the Alabama River, some 400 miles above Mobile. It contains a fine state-house and a handsome Masonic hall, and has a large number of manufactories, including foundries, flour-mills, steam cotton-gins, a cotton factory, and oil-works. Several railways meet here, and the river is navigable for steamboats all the year round; an active trade is carried on, and large quantities of cotton, especially, are shipped. Montgomery became capital of Alabama in 1847, and was for a time the capital of the Confederate States. Pop. (1880) 16,713; (1890) 21,790.

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Montgomery, a district of the Punjab, in the Multan division, and bounded by the Sutlej. The area is 5574 sq. m.; pop. (1881) 426,529. Its capital, Montgomery, midway between Lahore and Multan, has but 3500 inhabitants. It was named in 1865 after the governor of the Punjab.

Montgomery, FLORENCE SOPHIA, a popular writer of books for children, is the daughter of Sir Alexander Leslie Montgomery, Bart., of The Hall, County Donegal. Her first book, *A Very Simple Story* (1867), was warmly praised by Whyte-Melville. Of its successors the chief are the widely popular but not entirely satisfactory *Misunderstood* (1869), *Thrown Together* (1872), *The Town Crier* (1874), *Seaforth* (1878), *Peggy, and other Tales* (1880), and *The Blue Veil* (1883).

Montgomery, GABRIEL, COMTE DE, a French knight of Scottish extraction, and an officer in the Scottish Guard of the king of France, was born about 1530. At a tournament given, 30th June 1559, by Henry II. in honour of his daughter's marriage with Philip of Spain, the king insisted upon young Montgomery entering the lists with him. Montgomery reluctantly complied, and, the shaft of his broken lance entering the king's visor at the eye, Henry was borne insensible from the ground, and so continued for eleven days, when he died. Montgomery, though blameless, felt it impossible to remain about the court, and retired to the family estate in Normandy, afterwards travelling in Italy and England. On the commencement of the religious wars in 1562 he returned to support the Protestant cause, and defended Rouen with great bravery. In the third religious war he was one of the leaders of the Protestants, and gained many advantages over the royalists in Languedoc and Béarn. During the massacre of St Bartholomew he happened to be in Paris, but escaped by the swiftness of his horse, and took refuge, first in Jersey, then in England. In April 1573 he appeared off Rochelle with a small fleet, but failed in accomplishing anything, and was obliged to retire. Next year, at the head of a band of Huguenots, he landed in Normandy, and commenced war there; but being compelled at last to surrender the castle of Domfront, where he had entrenched himself, he was carried to Paris; and although the general to whom he surrendered had assured him of his life, he was beheaded, 27th May 1574.

Montgomery, JAMES, minor poet, was born at Irvine, Ayrshire, 4th November 1771, the eldest son of a Moravian pastor, and at six was sent to Fulneck (q.v.) in Yorkshire. He there spent ten dreamy years, and then was dismissed as unfit for the ministry; but meanwhile he had read by stealth many of the poets, and had tried his own hand at verse-making. After four years of various employment—with a baker at Mirfield (from this place he ran away), a general dealer at Wath, and a bookseller in London—in 1792 he became clerk to the editor of the Radical *Sheffield Register*. In 1794 he started a weekly paper of his own, the *Sheffield Iris;* and this he continued to edit till 1825. In 1795 he was fined £20, and sentenced to three months in York Castle, for striking off some copies of a 'seditious' ballad; in 1796 it was £30 and six months for describing a Sheffield riot. Yet by 1832 he had become a moderate Conservative; and in 1835 he accepted from Peel a government pension of £150. He died, unmarried, at Sheffield, 30th April 1854. His collected Poetical Works (4 vols. 1849) include *The Common Lot* (1805), *The Wanderer of Switzerland* (1806), *The West Indies* (1809), *The World before the Flood* (1813), *Greenland* (1819), and *The Pelican Island* (1827). 'Bland and deeply religious,' these poems have outlived their vogue; but ten at least of his hymns keep their place in the hymnals. His Memoirs by Holland and Everett (7 vols. 1854–56) is perhaps the worst Life in the language.

Montgomery, ROBERT, poetaster, was born at Bath in 1807, the son of one Gomery, a famous clown. In 1830 he entered Lincoln College, Oxford; in 1833 took his B.A. with a fourth class; in 1835 was ordained; and, with the exception of four years in Glasgow (1838–42), was minister of Percy Street Chapel, London, until his death at Brighton on 3d December 1855. Of his thirty-one works in verse and prose, two—*The Omnipresence of the Deity* (1828; 29th ed. 1855) and *Satan* (1830)—are still remembered, but only by Macaulay's onslaught in the *Edinburgh Review* for April 1830.

Montgomeryshire, an inland county of North Wales, 40 miles long and 35 broad, bounded NE. and NW. by the counties of Denbigh and Merioneth, E. by Shropshire, and S. and SW. by Radnorshire and Cardiganshire. Area, 773 sq. m., or 495,089 acres, of which more than one-third is laid down in permanent pasture, and 58,277 acres are under tillage. Pop. (1801) 47,978; (1831) 65,700; (1881) 65,718. Its surface is for the most part barren, and in places mountainous, Plinlimmon (2469 feet), on the Cardiganshire border, the Berwyn Mountains in the NE., and the Breidden Hills—some 12 miles E. of Shrewsbury—being the principal elevations; but towards the English border its character changes, and the predominating feature is that of a series of fertile and well-wooded valleys, in which grain of all kinds, but chiefly oats, is raised, and a small area is under cultivation as fruit orchards. On the uplands the soil is poor, and principally adapted for pasturing the large flocks of sheep reared thereon. The Severn, with its tributary the Vyrnwy, and the Dovey—alike noted for their fishing—are the most important rivers, whilst Offa's Dyke (q.v.) traverses the south-east corner of the county. The mineral wealth of Montgomeryshire is not great, but lead and zinc are mined, and slates, slabs, and limestone quarried. Of manufactures, that of Welsh flannel at Newtown is the most extensive. The county comprises nine hundreds, the municipal boroughs of Llanidloes and Welshpool, and sixty-eight parishes. One representative is returned to the House of Commons for the county, as also one for the Montgomeryshire district of boroughs—viz. Llanfyllin, Llanidloes, Machynlleth, Montgomery, Newtown, and Welshpool, which too are the chief towns. The County Council consists of fifty-six members.—The *county town* Montgomery is 7 miles S. of Welshpool. Pop. 1194.

Month. This, the earliest of the natural cycles to be observed, was at first reckoned from new moon to new moon. That period is now called a *lunation* by astronomers to distinguish from *sidereal month*, the time in which the moon passes round the ecliptic to the same star, and from the *tropical month*, reckoned from the moon's passing the equinox till she again reaches it. Those three periods are also called, respectively, synodic month = 29·5306 days, stellar month = 27·3217 days, and periodic month = 27·3216 days. The first, or 'lunar month' proper, consists of 29 days, 12 hours, 44 minutes, 3 seconds. The 'solar month' is the time which the sun takes to pass through 30° (see CALENDAR, CHRONOLOGY). From the month, by subdivision, was obtained the week, used by the Chaldeans, Indians, Egyptians, and others from prehistoric times; and as soon as the year became an object of measurement there were numberless attempts to reconcile the solar computation of time with the lunar. The Attic year was of twelve months, alternately 29 and 30 days long, each month being divided into three decades.

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The Jews, Arabians, and Turks still reckon by the lunar months of 29 and 30 days, and are therefore compelled, like the ancient Greeks, to insert an intercalary or 'embolismic' month. The French republicans in 1793 divided the year into twelve months of 30 days, with five odd days (six in leap year) to be utilised as national festivals, each month being subdivided into three decades of 10 days each, as with the ancient Greeks. Another distribution of the months has since been suggested, should such opportunity again occur—viz.: 1st, 3d, 5th, 7th, 9th, 11th months, each 30 days; 2d, 4th, 6th, 8th, 10th months, each 31 days; and the remaining month 30 days in the ordinary year and 31 in leap year. The existing 'calendar' or 'civil' months are as irregular in length as they were left by the Romans; the 4th, 6th, 9th, and 11th having 30 days, the second 28 days (or 29 in leap year), and the seven others 31 days. To complicate this disorder, a month in English law is 'a lunar month or 28 days unless otherwise expressed;' 'a lease for twelve months is only for 48 weeks' (Blackstone, ii. 141). Besides the archaic division of the month into four, as already mentioned, the early Greeks of Homer's time and previously seem to have had only two parts, the earlier half and the 'waning half;' and a trace of that probably remained in the Roman *Ides*, the middle or dividing day of each month.

Montholon, CHARLES TRISTAN DE, Count of Lee, an associate of Napoleon I. at St Helena, was born at Paris, 1782. Having served six years in the navy, he entered the army in 1798, and took part in a number of campaigns, being severely wounded at Wagram. Napoleon made him his chamberlain in 1809, and entrusted him with minor diplomatic missions. During the Hundred Days, after the emperor escaped from Elba, Montholon was Napoleon's adjutant-general. He accompanied his master to St Helena, and along with Gourgaud published *Mémoires pour servir à l'Histoire de France sous Napoléon, écrits à Ste-Hélène sous sa dictée* (8 vols. Paris, 1822–25). He afterwards published *Récits de la Captivité de Napoléon à Ste-Hélène* (1846). In the proclamations which Louis Napoleon issued on his landing at Boulogne in 1840, Montholon was named chief of his staff, and on this account was condemned by the Chamber of Peers to twenty years' imprisonment; he regained his freedom after the February revolution (1848), having published in 1846 *Récits de la Captivité de Napoléon à Ste-Hélène* (2 vols.). He died 24th August 1853.

Monthyon. See MONTYON.

Monti, VINCENZO (1753–1828), an Italian poet of the classical school, remarkable for his political tergiversation, anti-French, Napoleonist, pro-Austrian in turn. He was professor at Pavia, and, under Napoleon, state historiographer. His translation of the *Iliad* is admirable.

Montilla, a town of Spain, 23 miles SSE. of Cordova by rail. Pop. 13,207.

Montjoie St Denis, the French war-cry, old at least as Wace's day (12th century), from the hill near Paris on which St Denis (q.v.) underwent the joy of martyrdom. See HERALD.

Montluçon, a town in the French department of Allier, on a castle-crowned hill whose base is washed by the Cher, 202 miles S. of Paris. It owes its rapid development to the opening up of the Commentry coalfield, and has large iron-works and plate-glass manufactories. Pop. (1872) 20,251; (1886) 26,250. Néris-les-Bains, 18 miles SE., is the *Neriomagus* of the Romans—of whom many traces are left—and since 1821 has again risen into repute through its warm alkaline mineral waters (126° F.). Pop. 1675.

Montmartre. See PARIS.

Montmédy, a town and fortress in the French department of Meuse, 25 miles N. of Verdun and 31 miles by rail SE. of Sedan, consists of two portions, the citadel and upper town overlooking the lower town, which lies in the valley of the Chiers, a tributary of the Meuse. Built and fortified in 1235, it was taken by the French in 1542, 1555, 1596, and 1657; they, after it was definitely assigned to them by the peace of the Pyrenees (1659), had it reconstructed and re-fortified by Vauban. It was, however, captured by the Germans in 1815 and again in 1870. Pop. 2740.

Montmorency, a river of Quebec, a tributary of the St Lawrence, famous for its beautiful falls, 8 miles NE. of Quebec. Here the stream is 100 feet wide, and the falls have a sheer descent of 250 feet.

Montmorency, ANNE, first DUC DE, Marshal and Constable of France, born 15th March 1492, belonged to one of the oldest and greatest of the noble families of France. Brought up along with Francis I., he distinguished himself by his gallantry and military skill at Marignano (1515) and in the defence of Mézières, and was taken prisoner along with his sovereign in the battle of Pavia (1525). In consequence of his efforts to win his master freedom, and his successful warring against the emperor's armies, he was made Constable in 1538; but, being suspected by the king of siding with the Dauphin against him, he was banished from court in 1541. On the accession of Henry II. (1547) he was restored to his former position and dignities. In 1557 he commanded the French army which suffered the terrible defeat of St Quentin at the hands of the Spaniards, in which he was again taken prisoner. During the minority of Charles IX. Montmorency, with the Duke of Guise and the Marshal St André, composed the triumvirate which opposed the influence of Catharine de' Medici. In 1562 he commanded the royal army against the Huguenots at Dreux, and was taken prisoner a third time. In the following year he drove the English out of Havre. He again engaged Condé at St Denis (1567), but received a fatal wound, of which he died at Paris on the following day, 11th November 1567. See Life by Decrue (2 vols. Paris, 1885–89).

Montmorency, HENRI, second DUC DE, grandson of the famous Constable de Montmorency, was born at Chantilly, 30th April 1595. His godfather was Henry IV., who always called him his 'son.' When he was seventeen years of age Louis XIII. made him admiral and viceroy of Canada, and in the following year governor of Languedoc. During the religious wars of 1621 and the following years Montmorency commanded the Catholics in the south against Rohan, was almost captured at the siege of Montpellier (1622), took the islands of Ré and Oléron from the defenders of Rochelle (1625), and penetrated into Piedmont (1630). But Richelieu, jealous of his popularity, provoked him into rebellion along with the king's brother, Gaston, Duke of Orleans. Marshal Schomberg was sent against him, defeated him at Castelnaudary, and took him prisoner. Montmorency, covered with wounds, was carried to Toulouse, sentenced to death by the parliament, and, notwithstanding the intercession of King Charles I. of England, the pope, the Venetian Republic, and the Duke of Savoy, was beheaded, 30th October 1632. Montmorency was distinguished for his amiability and the courtesy of his manners, as well as for his valour.

Montoro, a town of Spain, on the Guadalquivir, 26 miles ENE. of Cordova. Pop. 13,293.

Montpelier, the capital of Vermont since 1805, is on the Winooski or Onion River, 206 miles by

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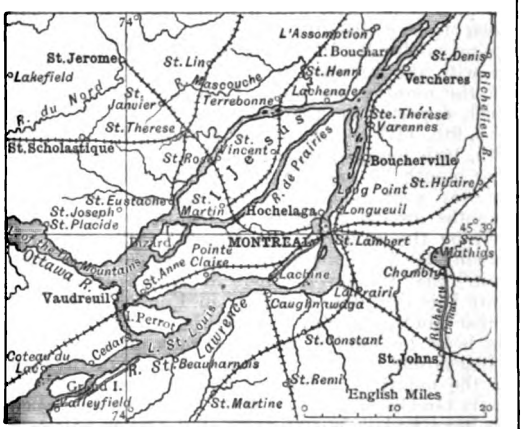
rail NNW. of Boston. It contains a handsome granite state-house, with a statue of Ethan Allen, and has some mills and tanneries. Pop. 3219.

Montpellier, the capital of the French department of Hérault, on the river Lez, 6 miles from the sea and 31 SW. of Nîmes. Pop. (1872) 54,466; (1886) 53,506. Lying near the centre of Languedoc, on the great route from Italy and Provence to Spain, with its seaport at a point offering the shortest land-route not only to all parts of Languedoc, but to north France, Montpellier's position was a highly favourable one during the middle ages. Hence alike its commercial and intellectual importance, and its stormy history, during which it was sometimes independent, and sometimes under the suzerainty of Aragon or Navarre, before finally becoming a possession of the French crown in 1392. Its schools of medicine, law, and arts, developing during the 12th and 13th centuries, were formally constituted a university by a papal bull in 1289, at which time the schools of law and medicine (the latter founded by Arabian physicians) rivalled those of Paris. In the following century Petrarch was a student at the law school, and Arnaud de Villeneuve, the alchemist and physician, was teaching in the medical school. With such a geographical position Montpellier was easily stirred by the Renaissance. Rabelais and Rondelet the anatomist both graduated in medicine in 1537; Casaubon was made Greek professor in 1586. After Rondelet there is a continuity almost unique in the history of science. A pupil of his founded the famous botanic garden (the oldest in France) in 1593; other pupils, Lobel, Clusius, the brothers Bauhin, were highly distinguished amongst the earlier botanists (see BOTANY). At the end of the 17th century (during which Clarendon and Locke had been residents), Magnol again made Montpellier the centre of the science, and reckoned among his pupils Tournefort and the elder De Jussieu. De Candolle also wrote here some of his principal works, and laid out the first botanic garden upon the natural system in 1810. The medical school had also a notable history; and a new period of activity is indicated by the celebration of the sexcentenary of the university (1890), with its reorganisation upon the fullest scale of equipment. The town has also an important picture-gallery and library.

A centre of wine production, upon which its present prosperity depends, Montpellier suffered greatly by the phylloxera; but it was here that the cure of grafting French vines upon American stocks was earliest applied. The new School of Agriculture, chiefly devoted to the practical study of wine and silk culture, is very flourishing. Of the mediæval town little remains, its fortifications and most of its buildings, save the cathedral and the adjoining bishop's palace (which now houses the school of medicine), having been destroyed in the religious wars, in the Revolution, or by municipal improvements. The older streets are crooked and narrow, but afford better shelter from the sun, and from the chilling *mistral*, than do the modern ones. The chief modern buildings are the theatre and law-courts; but the principal glory of the town is its two great terraces, forming public promenades overlooking the undulating country dotted with innumerable *mazés* or country cottages, and in the distance the Mediterranean, Cevennes, Pyrenees, and Alps. See Duval Jouve, *Montpellier;* Aigrefeuille, *Histoire de Montpellier* (1739; new ed. 1877).

Montreal, the largest city of the Dominion of Canada, is the centre of Canadian commerce, of Canadian banking, and of the extensive system of railways by which the country is now covered. It is built on the south-east side of an island formed by the junction of the Ottawa River with the St Lawrence, and may be said in general terms to be situated on the northern bank of the St Lawrence.



The city is about 4 miles long and 2 wide, the Central Mountain rising in the rear narrowing the city at its base for some distance. It is not the political capital of the province of Quebec, but it exerts an immense political influence, and practically not only directs the political business of Quebec, but exerts also by means of its banks, its manufactures, and its great importing and distributing commercial houses a great influence on the public policy of the Federal Government. It is also the seat of the greatest universities, hospitals, convents, and seminaries in all Canada. Finally it is during the season of navigation—i.e. from May to November—the great maritime port of the Dominion, a dozen transatlantic steamship companies making it one of their headquarters; while a lake and river and coast navigation of great activity increases and diversifies the business of the city. It is nearly 1000 miles from Montreal to the ocean proper, and 250 to the first salt water. Pop. (1871) 107,225; (1881) 140,747; (1891), including suburbs taken into the city, about 220,000. In 1881 the people were divided into 78,684 of French descent, 28,995 Irish, 16,407 English, and 12,531 Scotch, with a sprinkling of various other nationalities. The revenue of the city in 1888 was $2,095,411, and the expenditure $2,062,275.

The growth of the commerce of Montreal is very remarkable. In 1870 the imports amounted to $23,698,688 and the exports to $11,222,101. In 1889 the imports were $43,948,594 and the exports $29,032,613. The 1500 miles of the St Lawrence River contribute to this growth of export, and distribute largely the growth of import. The total of receipts of grain, flour, and meal at Montreal in 1889 amounted to 18,722,865 bushels; the shipments of the same were 15,257,678 bushels. In 1870 vessels of a total tonnage of 208,627 tons (183,913 British, and 2323 American) entered at Montreal; in 1889 the tonnage was 529,538 tons (484,172 British, and 473 American), while in the French shipping there was an increase of 10,000 tons. The Federal Government having assumed the debt of the port incurred for deepening the channel, and the canal tolls having been reduced to a minimum with a prospect of being entirely abolished in order to encourage a through trade, the future of the port of Montreal as a practically free port seems assured. The canal system which finds its outlet at Montreal is remarkable. By means of the canals Montreal is enabled to touch and handle

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the trade of Duluth and Fort William on Lake Superior, of Chicago and Milwaukee on Lake Michigan, Collingwood and Goderich on Lake Huron, Buffalo and Cleveland on Lake Erie, Hamilton, Toronto, Kingston, and Oswego on Lake Ontario. These canals afford a continuous course of water-communication extending from the Straits of Belle Isle to Port Arthur at the head of Lake Superior, a distance of 2260 miles. The aggregate length of the St Lawrence canals is 70½ miles. Montreal is the headquarters of the Grand Trunk Railway, the Canadian Pacific Railway, the South-Eastern Railway, the Central Vermont Railway. These great roads open up by means of various connections the whole railway-system of the United States and Canada, and the Canadian Pacific Railway has a through line from Montreal to Vancouver City in British Columbia, a distance of 2906 miles. In the boot and shoe manufacture over 3000 hands are employed, in clothing-factories over 2500, in tobacco-factories about 3000, in the breweries about 500; and in the workshops of the railways an army of men are employed. There are also rubber-factories, sawmills, sack-factories, tool-factories, silk-factories, cotton-mills, and an endless variety of small industries which receive encouragement from the protection afforded by the tariff. Montreal has therefore been strongly in favour of the protective system.

Of the Episcopal churches, Christ Church Cathedral has a tower 224 feet in height, and St George's of 230 feet. The Catholic churches are numerous and some of them splendid: St Peter's Church is a repetition on a smaller scale of the church at Rome; Notre Dame holds 10,000 people; St Patrick's is the church of the Irish Catholics. In the French churches the preaching is generally in the French language. The Presbyterians have eight larger and several smaller churches, the Methodists have eleven, and other denominations also are well represented. In all there are seventy-four churches in the city. Education in Montreal is conducted under the law of the province of Quebec. It is denominational in character, the vast majority of the schools being of course Roman Catholic. The Protestant schools are under the control of a special board. The taxes on Catholics go to the Catholic schools, the taxes on Protestants to Protestant schools. M'Gill University, which obtained its charter in 1821, has been an active establishment since 1852; over 1200 graduates claim it as Alma Mater. Laval University of Quebec has a branch at Montreal; the seminary of St Sulpice, founded in 1657, is a theological institution, training about 300 pupils at one time; the Presbyterian College, chartered in 1865, has an endowment and property amounting to over a quarter of a million of dollars; the Wesleyan Theological College was founded in 1873; and others in the long list are the Congregational College, the Anglican Diocesan College, St Mary's College, founded in 1848 by the Jesuits, the academic hall of which holds 1200 people, and the pupils in attendance numbering about 350, the Jacques Cartier Normal School, under the control of the provincial government, the Christian Brothers' Schools, the schools and convents of the congregation of Notre Dame, the schools and convents of the Sacred Heart. M'Gill College has a library of 25,000 volumes, the Advocates' Library has 15,000 volumes, the Presbyterian College Library 10,000 volumes; the Mechanics' Institute, the Fraser Institute, and the Y.M.C.A. have also libraries of some value. There are about fifty papers published in the city, including six French and five English dailies, and ten French and eight English weeklies. The *Quebec Gazette* (1764) was the first paper published in Canada; the *Montreal Gazette* (1778) is the next oldest, and is the leading journal still. There are musical, art, and historical associations also which maintain in Montreal a taste for art, literature, and science not common in colonial commercial cities. Among the chief philanthropic institutions are the General Hospital, costing $40,000 a year; the Protestant House of Industry, to which 20,000 people a year have access; the Y.M.C.A. building; the Dispensary, aiding about 10,000 persons a year; the Gray Nuns' Hospital (1755), which is also a foundling hospital; the Hôtel Dieu (1644), with 350 beds, receiving over 3000 persons per annum, and costing about $35,000 a year for maintenance.

History.—Montreal was purchased from the president of the Hundred Associates of France, a trading corporation, by Abbé Olier and Dauversière, who were moved by religious enthusiasm to establish institutions there; it was actually founded by Maisonneuve, the leader and military head of the enterprise of Olier and Dauversière, who landed at Montreal (*Ville-Marie de Montreal*) on the 18th May 1642. The early history of the city was one of continuous struggles against the Iroquois Indians, by whom the whole island was more than once devastated up to the very palisades of the town's defences; and in 1660 the Indians almost exterminated the population not actually within the feeble defences. In 1722 the city was fortified with a bastioned wall and ditch. In September 1760, the year following the capture of Quebec by Wolfe, Montreal was surrendered by the French governor, De Vaudreuil, to the British, under Lord Amherst and General Murray. In 1776–77 the city was occupied by the invaders from the revolted colonies, who did their best to coerce or cajole the Canadians into joining in the rebellion. In 1777 the British forces advanced from Quebec, and Montreal was evacuated by the invaders. Since that time the history of the city has been peaceful. The war of 1812–14 did not disturb its progress. The rebellion of 1837 for a moment ruffled its political serenity; but all its modern history has been the history of constitutional development, of business progress, of educational advancement, and of growth in population.

Montreux, a group of villages on the north shore of the Lake of Geneva, 15 miles by rail SE. of Lausanne. The name properly belongs to one small hamlet, but is popularly extended so as to include the adjoining villages of Clarens, Vernex, Veytaux, &c., with a population of 8019. The beautiful situation and mild climate of 'the Swiss Nice' attract many invalids to the place, which abounds with hotels and *pensions*. Near it is the castle of Chillon. See Steiger's *Der Kurort Montreux* (Zur. 1886).

Montrose, a seaport of Forfarshire, 76 miles NNE. of Edinburgh and 42 SSW. of Aberdeen. It stands on a level peninsula between Montrose Basin (a tidal loch, measuring 2 by 1¾ miles, but almost dry at low-water) and the mouth of the river South Esk. A fine suspension bridge (1829), 432 feet long, leads to Inchbrayock or Rossie Island, in the Esk's channel, and is continued thence by a drawbridge; and there is also a railway viaduct (1883). Montrose has a plain town-hall (1763–1819); a large parish church (1791–1834), with a steeple 200 feet high; an academy (1820); a lunatic asylum (1868), 2 miles NNW.; good links; and a wet-dock (1840). The foreign trade—timber its staple—is chiefly with the Baltic and Canada; and the average tonnage of ships entering the port exceeds 90,000 tons per annum. Flax-spinning is the principal industry; and ropes, canvas, soap, &c. are also manufactured. Montrose was the birthplace of Robert Brown, botanist; Joseph Hume; Sir Alexander Burnes;

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and Paul Chalmers, R.S.A. It has memories, too, of Edward I., the two Melvilles, the Great Marquis, the Old Pretender, Dr Johnson, and Lola Montez. A royal burgh since 1352 and earlier, it unites with Arbroath, Brechin, Forfar, and Bervie to return one member to parliament. Pop. (1851) 15,238; (1881) 14,973. See Mitchell's *History of Montrose* (Montrose, 1866).

Montrose, JAMES GRAHAM, MARQUIS OF, belonged to a family which can be traced back to the year 1128, and which since 1325 had been settled at Old Montrose, in Maryton parish, Forfarshire, near Montrose town. It had been ennobled with the titles of Lord Graham (1451) and Earl of Montrose (1505); and three of its members had fallen at the battles of Falkirk, Flodden, and Pinkie; whilst another, Sir William Graham, early in the 15th century married for his second wife Mary, daughter of Robert III.—a marriage from which sprung the Grahams of Claverhouse. John, third Earl of Montrose, was chancellor and, after James VI.'s accession to the English crown, viceroy of Scotland. His successor, John, married Lady Margaret Ruthven, eldest sister of the unfortunate Earl of Gowrie; and the issue of this union was five daughters and one son, James, the 'great marquis,' who was born in 1612 at Old Montrose. His mother died in 1618, his father in 1626. Next year the young earl was sent to the university of St Andrews by his guardian and brother-in-law, Archibald Lord Napier, son of the famous inventor of logarithms. He was proficient in all field-sports, and an apt if not ardent student, besides exhibiting a genuine love of literature, which his stormy after-life never destroyed. In 1629 he married Magdalene Carnegie, daughter of the first Earl of Southesk, and he lived at Kinnaird Castle, his father-in-law's seat, till in 1633, on attaining his majority, he left Scotland to travel in Italy, France, and the Low Countries.

On his way home, in 1636, he had an audience with Charles I., but, owing to the machinations of the Marquis of Hamilton, was coldly received; and he had not been long back in Scotland before by the 'canniness of Rothes' he was 'brought in' to the ranks of the king's opponents, at this time comprising the great mass of the Scottish nation. Montrose returned in the very year (1637) when the tumults broke out in Edinburgh on the attempt to introduce Laud's Prayer-book; and he was one of the four noblemen selected to compose the 'Table' of the nobility, which, along with the other Tables of the gentry, the burghs, and the ministers, drew up the famous National Covenant (q.v.). In the summer of 1638 he was despatched to Aberdeen, to coerce it into subscription; and in 1639 he made three military expeditions thither. On the first occasion (30th March) he employed conciliation; Baillie laments his 'too great' humanity. On the second (25th May) he imposed on the city a fine of 10,000 merks, but, though his soldiers committed some acts of pillage, he resisted the importunities of the Covenanting zealots to give 'Meroz' to the flames, and Baillie again complains of 'his too great lenity in sparing the enemy's houses.' The arrival at Aberdeen by sea of the Earl of Aboyne, Charles's lieutenant of the north, with reinforcements, caused Montrose to retreat, followed by the earl and the Gordon Highlanders; but at Meagra Hill, near Stonehaven, on 15th June, he won a complete victory, and four days later, after storming the Bridge of Dee, he was once more master of Aberdeen. The citizens expected some bloody punishment for their well-known Episcopalian leanings, but again Montrose agreeably disappointed their fears, again to be upbraided by the Committee of Estates for not having burned the town.

News now arrived of the 'pacification of Berwick,' and terminated the struggle in the north. Charles invited several of the Covenanting nobles to meet him at Berwick. Among those who went was Montrose; and the Presbyterians dated what they regarded as his apostasy from that interview. His political position was certainly different after his return. In the General Assembly which met in August 1639 he showed symptoms of disaffection towards the Covenant; and one night, it is said, a paper was affixed on his chamber-door, '*Invictus armis, verbis vincitur.*' In the second Bishops' War, when, on 20th August 1640, 25,000 Scots crossed the Tweed, Montrose was the first to plunge into the stream; but that very month, with eighteen other nobles and gentlemen, he had entered into a secret engagement at Cumbernauld against the dictatorship of Argyll, to whom and the zealots Montrose was as hostile now as he ever had been to Hamilton and the 'sometime pretended prelates.' It leaked out that he had been secretly communicating with the king; and when the Scottish parliament met (November 1640) he was cited to appear before a committee. The affair of the 'Cumbernauld Bond' was brought up; but nothing came of it, though some of the fiery spirits among the clergy 'pressed,' says Guthrie, 'that his life might go for it.' Next June Montrose with three others was accused of plotting against Argyll, and confined till November in Edinburgh Castle. Clarendon's story that Montrose, about this period, offered to the king to assassinate Argyll and Hamilton may safely be set aside; but to Hamilton he owed the rejection of his two proposals in the following year to raise the royalist standard in the Highlands.

In 1644, however, he quitted his forced inaction at Oxford, where he had been residing with Charles, and, disguised as a groom, made his way into Perthshire, with the rank of lieutenant-general in Scotland and the title of Marquis of Montrose. At Blair-Athole he met 1200 Scoto-Irish auxiliaries under Alaster Maccoll Keitache Macdonell ('Colkitto'), and placed himself at their head, the clans quickly rallying round him. Marching south, on 1st September he fell on the Covenanting army, commanded by Lord Elcho, at Tippermuir, near Perth, and gained a signal victory. He next defeated a force of Covenanters at Aberdeen (13th September), and took possession of the city, which was this time abandoned for four days to all the horrors of war. The approach of Argyll, at the head of 4000 men, compelled Montrose, whose forces were far inferior in numbers and discipline, to retreat. He plunged into the wilds of Badenoch, recrossed the Grampians, and suddenly appeared in Angus, where he wasted the estates of more than one Covenanting noble. Having obtained fresh supplies, he once more returned to Aberdeenshire, with the view of raising the Gordons; narrowly escaped defeat at Fyvie in the end of October; and again withdrew into the fastnesses of the mountains. Argyll, baffled, returned to Edinburgh, and threw up his commission. Montrose, receiving large accessions from the Highland clans, planned a winter campaign, marched south-westward into the country of the Campbells, devastated it frightfully, drove Argyll himself from his castle at Inveraray, and then wheeled north intending to attack Inverness. The 'Estates' at Edinburgh were greatly alarmed, and, raising a fresh army, placed it under the command of a natural son of Sir William Baillie of Lamington. He arranged to proceed by way of Perth, and take Montrose in front, while Argyll should rally his vast array of vassals, and fall on him in the rear. The royalist leader was in the Great Glen of Albin, the basin of the Caledonian

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Canal, when he heard that Argyll was following him. He instantly turned on his pursuer and surprised and utterly routed him at Inverlochy, 2d February 1645. Fifteen hundred of the Campbells were slain, only four of Montrose's men. He then resumed his march northward, but did not venture to assault Inverness, his wild mountaineers being admirably fitted for rapid irregular warfare, but not for the slow work of beleaguerment. So, directing his course eastward, he passed with fire and sword through Moray and Aberdeenshire. Baillie and Hurry, his lieutenant, were at Brechin, but Montrose by a dexterous movement eluded them, captured and pillaged Dundee (3d April), and escaped safely into the Grampians. On 4th May he routed Hurry at Auldearn, near Nairn, and on 2d July inflicted a still more disastrous defeat on Baillie himself at Alford in Aberdeenshire. 'Before the end of the summer,' he sent word to Charles, 'I shall be in a position to come to your Majesty's aid with a brave army;' and towards the end of the month he marched southward with upwards of 5000 men. He was followed by Baillie, who picked up reinforcements by the way, and who on 15th August again risked a battle at Kilsyth, but was defeated with frightful loss, 6000 of the Covenanters being slain. This, the last and most signal of Montrose's six splendid victories, seemed to lay Scotland at his feet, but the clansmen slipped away home to secure their booty, and Aboyne withdrew with all his cavalry. Still, with 500 horse and 1000 infantry, he had entered the Border country, when, on 13th September, he was surprised and hopelessly routed by 6000 troopers under David Leslie at Philiphaugh, near Selkirk. Escaping to Athole, he again endeavoured, but vainly, to raise the Highlands; and on 3d September 1646 he sailed for Norway, whence he proceeded to Paris, Germany, and the Low Countries.

Here it was that news reached him of Charles I.'s execution, whereat he swooned, and then reviving, 'swore before God, angels, and men to dedicate the remainder of his life to the avenging the death of the martyr.' So, on behalf of Charles II., he undertook a fresh invasion of Scotland, and from Orkney passed over to Caithness, his little army almost annihilated by shipwreck. Neither gentry nor commons would join him; but he pushed on to the borders of Ross-shire, where, at Invercharron, his dispirited remnant was cut to pieces by Strachan's cavalry, 27th April 1650. He fled into the wilds of Sutherland, and was nearly starved to death, when he fell into the hands of Macleod of Assynt, who sold him to Leslie. He was conveyed with all possible contumely to Edinburgh, where, dressed like a gallant bridegroom, he was hanged in the Grassmarket on a lofty gallows, 21st May 1650. Eleven years afterwards his mangled remains were collected from the four airts, and buried in St Giles's, where a stately monument was reared to him in 1888. He left a son, James, the 'good Marquis' (*c.* 1631–69), whose grandson in 1707 was created Duke of Montrose.

Montrose's few poems, all burning with passionate loyalty, are little known, save the one famous stanza commencing, 'He either fears his fate too much.' That has the right ring, one would think; and yet its ascription to Montrose is doubtful, first put forward in Watson's *Collection of Scots Poems* (1711). There are four portraits of Montrose—by Jameson (1629 and 1640), Dobson (1644), and Honthorst (1649). Of the inner man the finest estimate is Mr Gardiner's: 'When once he had chosen his side, he was sure to bear himself as a Paladin of old romance. If he made any cause his own, it was not with the reasoned calculation of a statesman, but with the fond enthusiasm of a lover. When he transferred his affections from the Covenant to the king, it was as Romeo transferred his affections from Rosaline to Juliet. He fought for neither King nor Covenant, but for that ideal of his own which he followed as Covenanter or Royalist. He went ever straight to the mark, impatient to shake off the schemes of worldly-wise politicians and the plots of interested intriguers. Nature had marked him for a life of meteoric splendour, to confound and astonish a world, and to leave behind him an inspiration and a name which would outlast the ruins of his hopes.'

See the Latin Memoirs by his chaplain, Dr Wishart (Amst. 1647; Eng. trans. 1756); Mark Napier's *Memoirs of Montrose* (1838; 4th ed. 1856); Lady Violet Greville's *Montrose* (1886); and Mr S. R. Gardiner's *History of England* (vols. viii.–x. 1884), *Great Civil War* (vols. i.–ii. 1886–89), and article in the *Dict. of Nat. Biog.* (vol. xxii. 1890).

Montserrat (Lat. *Mons Serratus*, so named from its saw-like outline), a mountain of Catalonia, in north-east Spain, 30 miles NW. of Barcelona. Its height is 4055 feet; and 'its outline,' says Ford, 'is most fantastic, consisting of cones, pyramids, buttresses, ninepins, sugar-loaves.' The pious Catalonians aver that it was thus shattered at the Crucifixion. Every rift and gorge is filled with box-trees, ivy, and other evergreens. From the topmost height the eye wanders over all Catalonia. The mountain, however, owes its celebrity to the Benedictine abbey built half-way up it, with its wonder-working image of the Virgin, and to the thirteen hermitages formerly perched like eagles' nests on almost inaccessible pinnacles. In 1811 the French, under Suchet, plundered the abbey, burned the library, shot the hermits, and hanged the monks (who had given shelter to their emigrant brethren at the Revolution). The place suffered still more in 1827, when it became the stronghold of the Carlist insurrection.

Montserrat, one of the Lesser Antilles, belonging to Britain, lies 27 miles SW. of Antigua. It is about 11 miles in length, 7 in breadth, and has an area of 32 sq. m. Pop. (1881) 10,083, of whom 1400 were at Plymouth, the chief town. Estimated pop. (1887) 11,000. The surface is very mountainous (3000 feet), and heavily timbered. Sugar and limes and lime-juice are the principal products. The island, governed by a president and a legislative council, is the healthiest in the West Indies. The imports average nearly £25,000, and the exports £21,100. The island was discovered in 1493, and colonised by the British in 1632. It has remained in their hands ever since, except for two short intervals (1664–68 and 1782–84), when it was in the possession of France.

Mont St Michel. See ST MICHEL.

Montyon Prizes, rewards for signal instances of disinterested goodness discovered throughout the year, awarded by the French Academy, according to the will of Jean-Baptiste-Robert Auger, Baron de Montyon (1733–1820), who bequeathed £120,000 to public hospitals, and the remainder of his fortune to give sums of money to poor patients on leaving Paris hospitals, and to found the prizes since connected with his name. Already in 1782 he had originated the prize of virtue, but on his return to France in 1815 he arranged the scheme in its final form. The Academy of Sciences awards annually a prize of 10,000 francs to the individual who has discovered the means of making any mechanical occupation more healthy, another of equal value for improvements in medicine and surgery; while the Forty themselves award the prize of virtue, and another to the writer of the work likely to have the greatest beneficial influence on morality—both alike of 10,000 francs a year.

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The last are usually divided among several recipients, and for these there seems to be a somewhat liberal standard of interpretation, for in a single year (1884), for example, we find awards given to a Journey to Japan, a Life of General Chanzy, a History of English Literature, and an Essay on Laughter. The same indulgence extends also to romance, all that seems required being some literary merit and a fair average of morality. Instead of rewarding works specially advantageous to morality, the Academy has been reduced to the necessity of crowning those which are content merely to respect it. In 1885 the Academy accepted a legacy of 10,000 francs to recompense particularly filial piety. A society was formed in 1833 to publish cheap lives and portraits of all men to be regarded as benefactors to their species; whether the benevolent, as Montyon, Howard, and Mrs Fry, or special originators like Jenner, Franklin, Davy, and Jacquard. A medal bearing the heads of Montyon and Franklin was struck at its foundation, and a gold medal is given every year. See Memoir of Montyon by Labour (Paris, 1881), and Taillandier's *Prix de Vertu* (1877).

Monuments. The Ancient Monuments Protection Act of 1882 constitutes the Commissioners of Works guardians of a certain number (some seventy groups) of monuments in Great Britain and Ireland; and provides for their being made guardians of as many more as from time to time the owners shall put under their care. The owners retain all their rights save as regards injuring or defacing the protected monuments; any person defacing or injuring them is liable to a fine not exceeding £5, or imprisonment for a month. The Commissioners, the specially appointed Inspector of Ancient Monuments, and their workmen are to have access to do what may be necessary to protect the monuments. In France famous castles and churches, as well as dolmens, &c., are among the *monuments historiques* protected by law. Many of these and other monuments at home and abroad are dealt with in special articles. See

Barrow.	Earth-houses.	Obelisk.
Brasses.	Hadrian's Wall.	Offa's Dyke.
Broch.	Kits Coity House.	Pyramid.
Cairn.	Maeshowe.	Round Towers.
Callernish.	Mausoleum.	Standing Stones.
Castle.	Monastery.	Stennis.
Colossus.	Mound Builders.	Stone Circles.
Dolmen.	Nurhag.	Stonehenge.

Monza (anc. *Modœtia*), a town of Italy, on the river Lambro, 9 miles by rail NNE. of Milan. The ancient capital of the Lombard sovereigns, it owed much of its early importance, and its chief public edifices, to Theodelinda; and in the middle ages, in spite of thirty-two sieges, it was conspicuous for the wealth of its numerous citizens and nobles, and the extent of its cloth-trade. The cathedral, founded in 595 by Theodelinda, and reconstructed in the 14th century, contains many interesting relics of this great queen. The famous Iron Crown, removed to Vienna in 1859, was restored in 1866 (see CROWN, Vol. III. p. 589). The town has also an interesting town-hall (1293), a royal palace (1777), and manufactures of cottons, hats, leather, &c. Pop. 17,077.

Moody, DWIGHT LYMAN, evangelist, was born at Northfield, Massachusetts, 5th February 1837, was for a while a shopman in Boston, and in 1856 went to Chicago, where he engaged with remarkable success in missionary work. In 1870 he was joined by Ira David Sankey, who was born at Edinburgh, Pennsylvania, 28th August 1840. In 1873 and 1883 they visited Great Britain as evangelists, attracting great crowds, and afterwards worked together there and in America. Mr Moody has published several volumes of sermons and other works, including *Best Thoughts and Discourses* (1876), which contains a sketch of his and Mr Sankey's lives. See also Daniel's *D. L. Moody and his Work* (Lond. 1875).

Mooltan. See MULTAN.

Moon, the satellite of the earth. It ranks among the larger satellites of our system, being an almost perfect sphere of 2160 miles in diameter. It revolves at a mean distance from the earth's centre of 238,833 miles. Its total surface is 0·074 of the earth's, or in sq. m. 14,657,402; and its volume 0·02034 of the earth's, or in cubic miles 5,300,000,000, or in terms of the sun's volume only $\frac{1}{49\,\cdot\,0000}$. Its mass is 0·0128 of the earth's, or in tons 78,000,000,000,000,000,000. Its density is 3·57 that of water, or 0·63 that of the earth. It travels in its orbit with a velocity of 3334 feet per second, and its equatorial velocity of rotation is 10 miles per hour. Presenting as large a surface

Fig. 1.—Comparative Sizes of the Earth and Moon.

to the eye as the sun, and changing both its form and position with great rapidity, it has necessarily always attracted a large measure of attention, and has proved in early ages and among savage peoples the most useful of the heavenly bodies for the measurement of time. Its motions, always interesting, have in modern times been most carefully observed and calculated, from their great value in enabling the traveller and navigator to determine the longitude (see LATITUDE AND LONGITUDE).

The explanation of the moon's changes of shape, from a thin crescent to a full disc, is the first problem presented to the most careless observer. A little watching shows that these are due conjointly to the globular form of the moon, its motion, and the fact that it does not shine by native light, but simply reflects the solar rays. The illuminated (or *convex*) edge of its figure is always turned towards the sun. When right opposite the sun it appears as full, and sometimes is so situated as to be partially obscured by the earth's shadow, the earth intercepting the solar light by which alone it shines. When it is near the sun in the sky it appears as a thin crescent, turning almost entirely its dark side to the earth. Sometimes, at new moon, it comes between us and the sun, obscuring his disc either in a partial or total Eclipse (q.v.). At either *half moon* the moon is said to be in *quadrature*, or in the 'first' or 'last quarter.' At new and full moon it is said to be in *syzygy* (Gk. *syn*, 'together;' *zygon*, 'yoke'). Our own observation will soon show that these changes result from the constant illumination of one side of the moon, and constant darkness of the other, the crescent being larger or smaller as, from the moon's change of position, we see more or less of the bright side.

Thus we see that the moon's phases depend on its motions over the sky, with reference to the sun. These motions and their causes we next consider. And it is most convenient in doing so to discuss first the *apparent motions*—i.e. the

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manner in which the moon moves over the surface of the sky, changing place like a driving cloud, though not with the same rapidity.

We can reduce all such motions to movements in the two easily-noted directions, first, *north* and *south*; secondly, *east* and *west*. And it is most convenient to take the sun as our point of reference. Sometimes the moon is north of the sun, and sometimes south, sometimes east of it, and sometimes west. It moves, then, in *both* of our two directions. But when we compare the east and west motion with the north and south we soon note an important difference. The east and west motion is continuously and steadily *from west to east*, carrying the moon right round the heavens; starting at new moon near the sun, and progressing until at full moon nearly the whole breadth of the sky separates them; then still progressing, until the sun is approached again from the opposite side. In fact, if the sun stood still at its setting for a lunar month, we should see the moon soar steadily *upwards* in the western sky, cross the whole expanse of heaven, and pass down below the eastern horizon. Then it would continue its course, returning to the sun, *beneath our feet*, and reach nearly its original position. To perform this cycle the moon takes 29·53 days, which is called its *synodical period*. If we took a bright star as the starting-point and goal of the moon's circle, instead of the sun, we should find the moon only take 27·32 days to return to the star. This is called the moon's *sidereal period*. The cause of the difference is that the star is steady in its position, while the sun slowly moves in his annual course in the same direction as the moon, which therefore has to *overtake* the sun when returning to him. Thus the motion from west to east is always in the same direction; but this is not the case with the north and south motion. While performing its cycle from west to east, say in the month of March, the moon begins by travelling northward at first, but latterly swings as far southward. In autumn the reverse is the case (see below). In December full moon occurs at the most northern point of its course, and in June at the southernmost. In winter, therefore, we have at *night* most light from the full moon, and in summer least. In March the *evenings* have least moonlight, and in September they have most. Attentively considering all these movements, we soon see that the moon travels round the earth in a curve not differing very much from a circle, for as it always appears nearly of the same size, it must remain constantly at nearly the same distance from the earth.

We have now almost insensibly passed from the observation of apparent motions to the idea of an *orbit* or *path*, which the moon traverses. And this leads at once to the consideration of the nature of this orbit, or the moon's *real* motions. Accurate observation reveals that the moon's distance from the centre of the earth is not the same in different parts of its orbit. It varies in apparent diameter from a maximum of 33′ 31″ to a minimum of 29′ 21″. As this variation forbids the idea that the orbit is a circle concentric with the earth, so it also forbids the idea that it is a circle eccentrically placed in regard to the earth. The true form is found to be that of an ellipse having an eccentricity of 0·05491, with the earth in one of the foci. This ellipse is, however, continually distorted by various *inequalities* to be noticed hereafter, chiefly due to the sun's attractive energy, which continually contends with that of the earth for the mastery over its satellite.

The lunar orbit is inclined to the ecliptic (or earth's orbit) at an angle of 5° 8′ 40″. The points where the two intersect are called the *Nodes* (q.v.), and the line joining them the *line of nodes*. The point of her orbit nearest the earth is the *perigee*, that most distant is the *apogee*, and the line joining them is called the *line of apsides*. Both the line of nodes and line of apsides change their place, the former turning completely round in 6793·391 days = 18·6 years, the latter in 3232·57 days = nearly 9 years. These motions take place, however, in opposite directions: the line of apsides revolves *with* the moon's orbital motion, the line of nodes *against* it. These motions are due to the sun's disturbing influence (see PERTURBATIONS). Each day, on an average, the moon describes 13° 10′ 35″ of the circle of her path. To do this requires, at its distance, an actual velocity of 2273 miles per hour. This velocity is found to be exactly what is required to balance the moon's *weight*, supposing that to be reduced in proportion to the square of its distance from the earth. Thus Newton concluded that the force retaining the moon in its orbit is simply its *weight*, or the mutual gravitation between it and the earth. This conclusion is verified by the elliptic form of the orbit, and the place of the earth in one focus. For an orbit of this form is produced by a force varying inversely as the square of the distance. Both the form of the orbit, then, and the varying nature of the force governing it, as well as the powerful disturbing influence of the sun, cause variations in the moon's velocity. Usually these are allowed for by taking as a foundation the *mean* or average angular velocity given above, and considering its variations under the title of *inequalities*, which must all be allowed for if the moon's place in the sky is to be predicted with accuracy at any time.

First in order is the *elliptic inequality* discovered by Hipparchus. It is caused by the quicker or slower motion of the moon as it passes over the nearer or more distant parts of its elliptic orbit. Its value is 6° 18′ nearly. Secondly, there is the *annual equation* (discovered by Tycho Brahé), a *yearly* effect, arising from the increase and diminution of the sun's disturbing force, as the earth approaches or leaves the sun in its annual course. This amounts to 11′ 10″, and, as our earth is nearer the sun in winter and farther off in summer, it causes the moon to be behind its mean place in the first part of the year and before it in the later months. Thirdly, there is the *variation* (discovered by Abul-Wefa). This arises from the changes in direction and amount of the sun's disturbing force, which are caused by the moon's motion in its own orbit. Its effect on the moon's longitude may amount to 39′ 31″. Fourthly, there is the *evection*, depending on the position of the axis of the moon's orbit, and the line of nodes, with regard to the sun. Its effects are complicated, but may amount to 1° 16′ 27″ on the moon's longitude, and 8′ 57″ on its latitude.

Besides these, the *parallactic inequality* is interesting, as giving a means of calculating the sun's distance from our earth. The sun's disturbing action varies in amount as the moon in its orbit is nearest or farthest away from the sun. This variation depends on the ratio of the moon's distance to that of the sun; so that, knowing the amount of the inequality and the distance of the moon, a value may be found for the sun's distance. Hansen showed by this means that the value long received for the sun's distance required to be diminished. See PARALLAX, SUN.

The *secular acceleration* of the moon was discovered by Halley in 1693 from a comparison of the times of Eclipses (q.v.) many centuries apart. This inequality is an increase of the moon's mean motion by about 12″ per century. It is partly due to a slow change in the form of the earth's orbit, by which the sun's disturbing force is slightly *lessened*, which is equivalent to an increase of the

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earth's attractive force, whereby the moon's angular velocity is increased. This part will, however, compensate itself in the course of ages. It is partly also due to a slow lengthening of the day—i.e. the period of the earth's rotation, which arises from the frictional action of the tides, that act like a brake upon the earth's surface. This portion remains uncompensated, of course.

The moon's distance from the earth is obtained by observations of its place from two widely-separated stations, such as the observatories at Greenwich and the Cape of Good Hope. If simultaneously observed from these, the moon will not appear to both observers in the same position among the stars; the amount of difference in apparent position depending on its distance from the earth at the time. From this difference is deduced the moon's *horizontal* parallax. This is the change in the moon's place which would be noted by an observer on shifting his place from the centre of the earth to a point on its surface where the moon would be seen on the *horizon*. The moon's mass being very nearly $\frac{1}{70}$th of the earth's, the force of lunar gravity at the moon's surface is then such that any object would weigh there only 0·15 of its weight at the earth's surface, and a falling body would there only traverse 2·48 feet in the first second of its course. The moon's rotation on its axis agrees in period with its revolution round the earth, so that, as has been said, we have always the same side presented to our view. Occasionally, however, we see a little round one or other edge owing to *Libration* (q.v.).

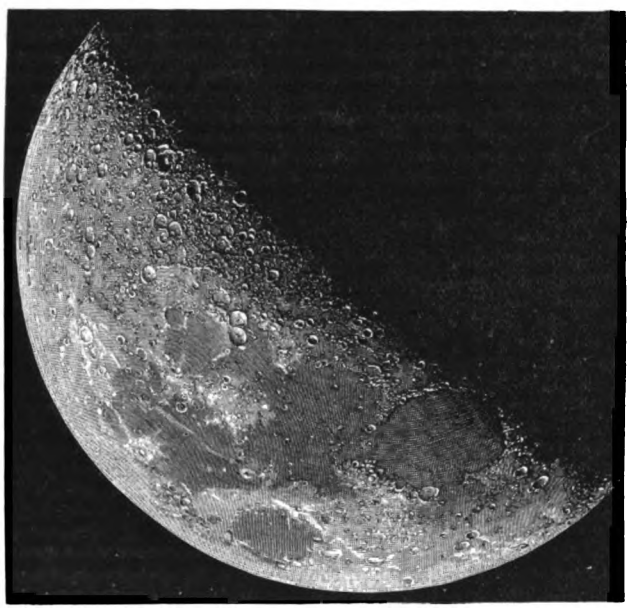

Fig. 2.—The Moon, first quarter (inverted, as seen through telescope). (From Photograph through the Great Lick Telescope, by Prof. S. W. Burnham.)

From these conditions of size, density, and mass we should expect that, while presenting some features of agreement, in most respects the moon would differ widely from the earth in *physical condition*. Even to the naked eye some peculiarities are obvious. Attentively watching the full moon, we soon become familiar with its irregularly-spotted surface, which *never changes*. It cannot then be like that of the earth, which is often obscured by clouds and mist. The telescope confirms this impression. All the details of the lunar surface are hard, cold, and glaring in their delineation. The delicate colouring and shade of terrestrial scenery is entirely absent. All is marked in white and black, or in various shades of yellowish gray. Nothing like mist, cloud, or vapour has ever been seen, except in some doubtful instances on the floor of the crater Plato, or other deep depressions. There is neither water to furnish vapour, nor atmosphere fit to bear clouds. Observation of the stars occulted by the moon (see OCCULTATIONS) confirms this, and, if there be even an attenuated atmosphere, it cannot have more than $\frac{1}{11}$th of the surface-density of our own. Bessel's maximum value for this of $\frac{1}{1000}$ has been shown by Neison to be too small, and it is not improbable that the moon possesses an atmosphere of extreme rarity, having a surface-density of probably about $\frac{1}{800}$th that of the earth. Vegetation and animal life appear to be equally absent from the moon, and the best modern theories of its state require us to regard the surface as either bare rock and sand, or as ice and snow. These theories have arisen in the attempt to explain the strange forms of the lunar surface. These forms have been classified, and the arrangement commonly in use is followed here as convenient. But it must not be regarded as a really scientific one. For some formations, while in their general aspect belonging to one class, might really be assigned to other classes in other respects.

The term *Mare* (Lat.) has been applied to the large dark plains, an example of which is the *Mare Crisium*, easily seen as an oval dark spot near the edge of the new moon. There are also large level areas which are brighter, and to which no special name has been attached. To one large irregular dark plain the title of *Oceanus Procellarum* has been given. The terms *Palus* (marsh), *Lacus* (lake), and *Sinus* (gulf) have been somewhat fancifully used to denote smaller dark areas.

Under the broad title *craters* have been grouped many formations, so different from one another that selenographers now divide them into walled plains, mountain-rings, ring-plains, crater-plains, craters, craterlets, crater-pits, crater-cones, and depressions—names expressive enough of more or less circular ramparts varying in size from 150 miles in diameter to a few hundred yards, and in depth, or height of walls, ranging from 18,000 feet downwards. In some parts of the lunar surface these literally swarm, crossing and interrupting one another, smaller ones perched on the edge or sides of larger ones, and, generally, in the flat bottom of the larger ones several of the smaller kinds are sure to be seen. Any moderately good telescope will show the larger kinds. Besides these there are the true *mountain ranges*, called the Lunar Alps, Apennines, Cordilleras, &c., similar in most respects to terrestrial chains. These range from 20,000 feet in height downwards, and where their profile is seen at the edge of the lunar disc they form distinct *notches*. The lunar *rills* (so named by Schröter, their discoverer, in 1787) are clefts or cracks in the surface, passing often right through mountains and valleys, sometimes for a distance of 300 miles, their breadth being relatively so small as to give them the appearance of true *cracks*.

Most striking of all lunar appearances are the broad white *rays*, which diverge from some of the principal lunar ring-plains. Those proceeding from *Tycho* extend, in one case at least, nearly 2000 miles. There are hundreds of them, and they

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range from 10 to 20 miles broad. They pass right on over mountains and plains, partaking of the shape of the surface at all points, but distinct from it in brightness. There are seven principal systems of these inexplicable streaks.

To denote the relative brightness of lunar formations a scale is used, the brightest being called 10°, and the less bright 9°, 8°, &c., down to 0°. These formations are variously named. The principal mountain ranges have been named after those on the earth. The craters are named after astronomers or philosophers, as Tycho, Plato, Aristotle, &c. The different parts of these, and smaller objects near them, are known by Greek or Roman letters, attached to the name of the chief object. Greek letters are used for peaks and hills, Roman letters for craters and depressions. Capital letters imply *measured* objects. For rills the letters ϕ, ξ, ψ, χ, θ, and η are chiefly used. But there are occasional variations from these rules, as in the case of most astronomical nomenclature.

These peculiar appearances, so different from those around us on the earth, have much puzzled astronomers. The usual theory attributes them to volcanic action, combined with shrinkage of the lunar globe on cooling. A recent theory explains them as the result of slow glaciation, the craters being lakes, around whose margins the quickly condensed vapour from their surfaces has fallen in mountains of ice. The craters are vents for water-vapour, and their cones masses of ice. To this theory the extreme rarity of the lunar atmosphere is favourable, but it cannot be said, any more than the volcanic theory, to meet all the difficulties. No thoroughly satisfactory explanation has as yet been proposed.

The total amount of light given by the full moon is probably less than $\frac{1}{300,000}$th of the sun. Its photographic intensity, however, has admitted of several fine photographs being taken, notably by Rutherford of New York, and recently by the fine telescope of the Lick Observatory, California.

Harvest-moon.—At or about the time of harvest in the north temperate zone the sun in its annual course is approaching the celestial equator, which it crosses from north to south on September 22. On that date it sets close to the exact western point of the horizon. If it happens to be then also full moon, the moon rises that evening as the sun sets, and is at its rising opposite the sun, or close to the exact eastern point of the horizon. Thus it begins to give light at sunset, and continues to do so until sunrise, when it sets opposite to the sun, just as the latter rises. This arrangement holds good without any great change for several days, so that there is practically no darkness, especially if the weather be fine. The full moon which thus illumines the autumn nights is called the *harvest-moon*. No other full moon in the year rises for so many days in succession so soon after sunset. If the date of full moon be not exactly September 22, still the same phenomena occur, though not with the same perfection, and the longer the interval between full moon and that date the less perfect they are. This is because the full moon, being on September 22, coincides with the time when the moon (being at full moon necessarily *opposite* the sun) is crossing the celestial equator from south to north, at which time its northward motion is most rapid. The position of any body on the Celestial Sphere (q.v.) determines the time of its rising at any place in our latitudes, and, if that position be altered, the time of rising will be altered also. If it moves *southward* the moon will tend to rise *later*, if it moves *northward* it will tend to rise *earlier*. We have seen that the moon's northward motion is most rapid when crossing the equator. Hence it has then a strong tendency to rise earlier each evening. But its motion towards the east (or *downwards*, when it is on the eastern horizon) gives it a tendency to rise later. These opposite tendencies, in the case of the September full moon, approach a balance, if the observer be in the latitude of northern Europe. Therefore the moon in that case rises only a few minutes later each evening for about a week. Farther north, about lat. 64½°, a balance is attained, and for two evenings the moon rises at the same time. Still farther north it rises *earlier* the second evening. But the most generally observed phenomena are of course those to be seen between latitudes 40° and 60°, which consist in the nearly full moon rising but little after sunset for several days in succession. In these latitudes of the southern hemisphere March enjoys the benefit of the harvest-moon, as September does in the north. And as celestial appearances are reversed to observers in different hemispheres, it follows that, when we have most benefit from the full moon, our neighbours at the antipodes have least.

The best charts of the moon's surface are those by Lohrmann, Beer, and Mädler, Schmidt of Athens (a gigantic work), and the Committee of the British Association. For further information readers may consult *Der Mond*, by Beer and Mädler (1837); *The Moon*, by Ed. Neison (1876); *The Moon*, by Nasmyth and Carpenter (1874; new ed. 1885); and for the lunar theory, popularly treated, Airy's *Gravitation*, and Sir J. Herschel's *Outlines of Astronomy*.

Superstitions regarding the Moon.—The moon was anciently an object of worship, and even in the 17th century she was supposed by the common people of England to exercise great influence over human affairs. The times for killing animals for food, gathering herbs, cutting down wood for fuel, sowing seeds of various kinds, were all regulated by the 'age' of the moon, and these set periods were considered to be a necessary part of practical knowledge, and ignorance or neglect of them to be infallibly productive of loss. There were similarly defined periods for taking particular medicines and attempting the cure of particular diseases. Many such superstitions prevailed till a recent period in the Highlands of Scotland, favourable or unfavourable consequences from any occurrence being predicted according to the age of the moon at the time it happened. Throughout Scotland the waning moon was considered to have an evil influence, and full or new moon to be the most auspicious season for commencing any enterprise. The same opinion was held in Scandinavia and Germany, and the history of all nations teems with similar superstitions. The special influence of the moon on persons of weak or wavering reason is preserved in our words *lunatic* and *moon-struck*, and is still an article of popular belief. Amongst mere superstitions must be ranked the old and widespread belief that the changes of the moon influence the weather on the earth, bringing about fair or rainy, settled or stormy weather; so that from the moon's periods predictions as to the weather may be made. The only known weather influence is a slight but appreciable tendency to dispersion of clouds shortly after full moon. See the article ECLIPSES.

In the Edda we read that 'Mundilföri had two children—a son, Mâni ('moon'), and a daughter, Sôl ('sun');' and in German the moon is masculine and the sun feminine to this day. It was the same in Anglo-Saxon, although modern English has in this matter followed the classic mythology, in which Phœbus and Sol are gods and Selene, Luna, and Diana are goddesses; Grimm (*Deutsche Mythologie*, p. 666) quotes an old invocation to the 'New Moon, gracious lord' (Neuer Mon, Holder Herr), for increase of wealth; and down to recent times

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the German people were fond of speaking of 'Frau Sonne' and 'Herr Mond' ('lady sun' and 'lord moon'). The same inversion (as it appears to us) of gender is found among the Lithuanians and Arabians, and even the ancient Mexican Meztle ('moon') was masculine. Among the Slavs, according to Grimm, the moon is masculine, a star feminine, and the sun neuter. See the Rev. T. Harley's *Moon-lore* (1886), itself containing a good bibliography.

Moon, MOUNTAINS OF THE, have played a mysterious part in African geography since the days of Ptolemy, who indicated them as containing the sources of the Nile. Their exact position was not known; they were generally figured on mediæval maps as a high range crossing the entire continent from Abyssinia to the Gulf of Guinea. As modern enterprise has opened up the interior of Africa, different mountain-chains and peaks have been identified as Ptolemy's Mountains of the Moon—for instance, the mountains of Abyssinia, the groups of Kenia and Kilima-Njaro, the so-called Kong (q.v.) Mountains inland from the Gulf of Guinea, and finally Mr Stanley's Ruwenzori and its fellows.

Moonshiners, a term in popular use in America, especially in the south-eastern states, for illicit distillers of whisky.

Moonstone. See FELSPAR.

Moonwort (*Botrychium lunaria*), an interesting fern, native of Britain, and widely distributed over northern Europe, penetrating to within the Arctic regions and Asia, and along with the few other species of which the family is composed appearing also in North America. The plant is of simple structure, consisting of a root-stock bearing a single erect stem from 3 to 6 inches high. A single pinnate leaf springs from the stem about midway from root to apex, the segments being half-moon shaped, pale green, and of thick consistence. The fructification is developed on a branched spike, pyramidal in outline, from 1 to 2 inches long, the branches all turning to one side. *B. virginicum*, the largest growing species, is named the Rattlesnake Fern, from the circumstance that it generally abounds in places frequented by that reptile.

Moor. See BOG, PEAT, WASTE LANDS; and for Grouse Moors and Moorfowl, see GROUSE.

Moore, DR JOHN, the author of *Zeluco*, was born in 1730 at Stirling, an Episcopal minister's son. Educated at Glasgow, he there studied medicine, and there began to practise, with Smollett's and his own old master, Dr Gordon, for his partner, after spending some time in Holland (as army surgeon), in London, and in Paris. As medical attendant to the young Duke of Hamilton he travelled six years on the Continent, and on his return (1778) settled in London. His *View of Society and Manners in France, Switzerland, Germany, and Italy* (4 vols. 1779–81) was well received; but the novel *Zeluco* (1789), which suggested Byron's *Childe Harold*, is to-day the least forgotten of his works. These include two other novels, *Medical Sketches*, and a couple of books on the French Revolution. Dr Moore died at Richmond, 21st January 1802. See the Memoir by Dr R. Anderson prefixed to his Complete Works (7 vols. 1820).

Moore, SIR JOHN, English general, born at Glasgow, 13th November 1761, was eldest son of the preceding. He entered the army as ensign when only fifteen, and first distinguished himself in the descent upon Corsica (1794); he served in the West Indies (1796), in Ireland during the rebellion of 1798, and in Holland in 1799. He was in Egypt in 1801 with the army under Abercromby, and obtained the Order of the Bath for his services in command of the reserve. When war again broke out in 1802 Moore served in Sicily and Sweden. In 1808 he was sent with a corps of 10,000 men to strengthen the English army in the Peninsula. He arrived in Mondego Bay, August 19, and assumed the chief command on the return to England of Sir H. Burrard. In October he received instructions to co-operate with the forces of Spain in the expulsion of the French from the Peninsula. He moved his army from Lisbon with the intention of advancing by Valladolid to unite himself with the Spanish general Romana, and threaten the communications between Madrid and France. But the apathy of the Spaniards, the successes of the French in various parts of the Peninsula, and, above all, the folly and intrigues of his own countrymen, soon placed him in a critical position. Yet he had determined to make a bold advance from Salamanca to attack Soult when the news reached him that Madrid had fallen, and that Napoleon was marching to crush him at the head of 70,000 men. Moore's forces amounted to only 25,000 men, and he was consequently forced to retreat. In December he began a disastrous march from Astorga to Coruña, a route of near 250 miles, through a desolate and mountainous country, made almost impassable by snow and rain, and harassed by the enemy. The soldiers suffered intolerable hardships, and arrived at Coruña in a very distressed state. It was impossible to embark without fighting, and Soult was in readiness to attack as soon as the troops should begin to embark. The battle was mainly one of infantry, for the cavalry after destroying their horses had gone on board, and the bulk of the artillery, for which the ground was not adapted, had also been withdrawn. On the 16th January 1809 the French came on in four strong columns. A desperate battle ensued. While animating the 42d Regiment in a brilliant charge in an early stage of the action, Moore was struck by a cannon-ball on the left shoulder and died in the moment of victory. The French were defeated with the loss of 2000 men; and the dead leader was buried at night just before the embarkation of his troops. The British army in this expedition lost their magazines and 6000 soldiers. Soult, with a noble feeling of respect for his valour, raised a monument to Moore's memory on the field of battle, and at home another was erected in St Paul's Cathedral. His uncommon capacity was sustained by the purest virtue and governed by a disinterested patriotism, while a certain heroic ascendency of character and the singular beauty of his person powerfully impressed every one who came near him. Wolfe's verses on the burial of Sir John Moore have helped to keep his memory green. See the Life by his brother (2 vols. 1834), and Napier's *Peninsular War* (vol. i.).

Moore, THOMAS, the 'Bard of Erin,' was born at 12 Aungier Street, Dublin, on 28th May 1779, the son of a Catholic grocer. From the school where Sheridan had been educated, and where he himself became a 'determined rhymer,' he passed in 1794 to Trinity College, and thence, after taking his B.A., proceeded in 1799 to London to keep terms at the Middle Temple. He brought with him a translation of Anacreon, which came out in 1800, dedicated to the Prince of Wales, his patron then, but the butt from 1813 of his satire. It proved a great hit, and, with his musical talent, procured him admission to the best society. In 1801 followed the *Poetical Works of the late Thomas Little*, whose pretty erotics were a good deal blamed, and very widely read. In 1803, through Lord Moira's influence, he was appointed registrar of the Admiralty court at Bermuda. He went there to arrange for a deputy, and, after a tour in

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the States and in Canada, returned in a twelvemonth to England—the democratic notions of his Dublin days toned down by his transatlantic experience. For his *Odes and Epistles* (1806) he was sharply taken to task in the *Edinburgh*. The bulletless duel with Jeffrey was the consequence, over which Byron made so merry, but which left the non-combatants fast friends for life. In 1811 he married an actress, good Bessy Dyke (1793–1865), and, after living successively in Leicestershire, in Derbyshire, and at Hornsey near London, in 1817 they settled at Sloperton Cottage, near Bowood, Lord Lansdowne's seat, in Wiltshire.

Meanwhile, among other fugitive pieces, Moore had published the earlier of the *Irish Melodies* (ten parts, 1807–34) and *The Twopenny Post-bag* (1812), whose tropes at once glittered and stung. Now he became anxious to emulate his brother-poets, who published in quartos. He fixed on an oriental subject, and in 1817 the long-expected *Lalla Rookh* appeared, dazzling as a firefly; and the whole English world applauded. After the publication he went with Rogers to Paris, and there wrote *The Fudge Family* (1818). For *Lalla Rookh* the Longmans paid him 3000 guineas; the *Irish Melodies* brought in £500 a year; but Moore had 'a generous contempt for money;' and about this time his Bermuda deputy embezzled £6000. Moore's liability was reduced by compromise to £1000, which he ultimately paid by his pen; but in 1819, to avoid arrest, he went to Italy with Lord John Russell. He spent five days at Venice with Byron (his friend since 1811), went on with Chantrey to Rome, and then with his family fixed his abode in Paris, where he wrote *The Loves of the Angels* (1823) and a prose romance, *The Epicurean* (1827). He returned in 1822 to Sloperton; and here, except for occasional 'junketings' to London, Scotland, and elsewhere, he passed his last thirty years. To those years belong the *Memoirs of Captain Rock* (1824), the *History of Ireland* (1827), and the Lives of Sheridan (1825), Byron (q.v., 1830), and Lord Edward Fitzgerald (1831). In 1835 he received a pension of £300, but his last days were clouded by sorrow and suffering—the loss of his two sons, and the decay of his mental faculties. 'I am sinking,' he writes to Rogers in 1847, 'into a mere vegetable.' He died on 25th February 1852, and was buried in Bromham Churchyard.

Moore in his lifetime was popular as only Byron; but to-day he ranks far below Wordsworth, Shelley, Keats. His muse was a spangled dancing-girl—light, airy, graceful, but soulless. *The Loves of the Angels*, his most ambitious effort, falls beneath even the Byronic standard; *Lalla Rookh*, again, is brilliant, but fatiguing. He is best in his lyrics; and even in them there is a certain sameness, with their eternal 'love of one's country, of the wine of other countries, and of the women of all countries.' See his *Memoirs, Journal, and Correspondence*, 'edited' by Lord John Russell (8 vols. 1852–56).

Moor-hen. See WATER-HEN.

Moorish Architecture. See ARABIAN ARCHITECTURE.

Moor Park. See FARNHAM.

Moors, a vague ethnographical expression applied to people whose geographical frontiers have been constantly shifting. First given (Mauri) to the inhabitants of the kingdom and subsequent Roman province of Mauretania, comprising within variable limits the whole country west of Numidia, now called Algeria and Morocco, later on it included the inhabitants of the whole of Africa north of the Sahara and Atlas from Tripoli westwards. Here for some three centuries flourished the great African church of Tertullian, Cyprian, and Augustine; in 429 the country was overrun by the Arian Vandals from Spain, but was recovered for the Byzantine emperors by Belisarius (533–36); invaded by the Arabs in 647, it was speedily subdued, and the Moors embraced Mohammedanism as quickly as they had embraced Christianity, and have clung to it ever since. From 1830 these countries have been gradually occupied and colonised by the French, with the exception of Tripoli and Morocco. The Arab slave-dealers and mixed Arab and Negro clans to the south are sometimes called the *Moors* of the western Soudan. In early or prehistoric times it is possible that the inhabitants north of the Atlas and of southern Spain, the builders of the megalithic monuments, may have been of the same race in both continents.

Whether in Algeria or in Morocco the Moors cannot be considered as a pure race. Some authorities take them as nearly equivalent to the Berbers, even the nomad tribes; others restrict the name to an admixture of Arab blood, and call Moors only the more settled Arabic-speaking population of the towns. According to some the Arabic stock is the Semitic element, the Berber or native is the Hamitic element in the resultant Moor. Though still numerous, the town Moors seem destined to dwindle before the European colonists. The more nomad Berber or Kabyle tribes will probably maintain their ground.

In European history the term is applied in a general way to the inhabitants of the Barbary states under Turkish rule, and to the actual inhabitants of Morocco, but in a special sense to the Arab and Berber conquerors and occupants of Spain from 711 to 1492. Within twenty years from their first landing these tribes had overrun the whole of Spain except the Asturias, had got possession of the Narbonnaise (719), had raided into France, till finally repulsed by Charles Martel near Tours in 732. For a short time one calif ruled the whole of Islam from beyond Bagdad to the Atlantic. When in 750 the Abbaside califs overthrew the Ommiades (Califs), a descendant of the latter, Abdurrahman I., escaped and founded the califate of the West at Cordova in 755. His dynasty lasted till the degradation of Hashim III. in 1031. Then after a period of anarchy the Almoravides (Berbers) succeeded from 1086 to 1147; the Almohades followed from 1130 to 1232. The greater part of Spain had now been lost, but the Beni-Nasr held Granada from 1232 to 1492. The chief steps of the Spanish re-conquest are the taking of Toledo, 1085; Saragossa, 1118; Valencia, by Jaime I. of Aragon, 1238; Seville, 1248; Murcia, 1260; Granada, 1492. The first of these invaders of Spain were mainly of Arab blood, and brought with them capacities of civilisation. From the 8th to the close of the 11th centuries the Spanish Moors in architecture, literature, science, industry, manufacture, and agriculture were far in advance of any northern European race of that date; no other people in western Europe could have then built a cathedral like the mosque of Cordova (784–793); in philosophy and in the terms of mathematical and astronomical science they have left their impress on most of the languages of western Europe. Only in religion were they inferior, and even here their toleration of the Christians, though contemptuous, contrasts favourably with that of the Christians towards the Moors after the conquest. But after the 12th and 13th centuries the conditions were reversed. The Moors had no reserve of civilisation or of increasing resources to fall back upon in northern Africa; they were degenerating, while behind Christian Spain was a Europe ever growing more civilised and richer in resources of every kind. The conquest was retarded by the division and intestine struggles of the Christian kingdoms; but these same causes told far more fatally on the Moors.

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There were never more than five or six separate Christian kingdoms; but the Moorish states were at times divided among over twenty little kings, and every dynasty in succession fell to pieces through intestine strife. The latest researches, especially in numismatics, are continually adding fresh proofs of this disunion, and augmenting the number of petty independent princes or chiefs. The advance of the Turks westward after the taking of Constantinople (1453) was too late to help their co-religionists in Spain. Barbarossa established himself in Barbary in 1518; but he failed at Malta in 1551 and 1565, and after the battle of Lepanto (1571), however much the Moors might harass Spain, there was no real danger of a reconquest. Their piratical efforts only served to raise a hatred between two chivalrous races who had once respected each other and to carry it to the bitterest fanaticism.

See the articles CALIFS, ALMORAVIDES, ALMAHADES, ALGERIA, ANDALUSIA, CORDOVA, GRANADA, MOROCCO, SPAIN, TUNIS; *Los Berberes en la Peninsula*, by F. M. Tubino (Madrid, 1876); *The History of the Mohammedan Dynasties in Spain*, by P. de Gayangos (2 vols. Lond. 1840); *Histoire des Musulmans d'Espagne*, by R. P. A. Dozy (4 vols. Leyden, 1861); *Recherches sur l'Histoire et la Littérature de l'Espagne*, by R. P. A. Dozy (2 vols. 3d ed. Leyden, 1881); *De causis cur Mohammedanorum cultura, &c.*, by R. P. A. Dozy (1869); *The Moors in Spain*, by Stanley Lane-Poole (Lond. 1887); *Libro de Agricultura*, by Abou Zacaria (2 vols. Seville and Madrid, 1878). The Arabic authorities are being collected and published in Spain and elsewhere. Several new MSS. have been lately discovered by Sr. Codera in the mosques of Tunis and Algeria.

Mooruk. See CASSOWARY.

Moose. See ELK.

Moquis, a tribe of Pueblo Indians, about 1800 in number, living in seven colonies in western Arizona.

Moradabad, a town of British India, the centre of a large trade in country produce, stands on the Ramganga, 100 miles E. by N. of Delhi. West of the town, and separated from it by the gaol, are the cantonments. The place is noted for its metal-work, especially brass and tin inlay. Other objects of industry are chintz and cotton cloth. Pop. (1881) 67,387.—The *district* has an area of 2281 sq. m., and a pop. (1881) of 1,155,173.

Moraine. The masses of rock which, by atmospheric action, are separated from the mountains bounding the valleys along which glaciers flow, find a temporary resting-place on the surface of the ice, at the margin of the glacier, and are carried along with it, but so slowly that they form a continuous line along each margin. These lines of debris are called *lateral moraines*. When two glaciers unite, the two inner moraines unite also and form one large trail in the middle of the trunk glacier, and this is called a *medial moraine*. A large portion of these rocky fragments at length reach the end of the glacier, and here the melting ice leaves it as a huge mound, which is known as a *terminal moraine*. The rock-debris, sand, clay, gravel, &c., which are dragged forward underneath the ice, are called *ground-moraines*, or *moraines profondes*. See GLACIER, BOULDER-CLAY.

Moralities. See MYSTERIES.

Moral Philosophy. See ETHICS.

Morano, a city of Southern Italy, built on a hill in a wild neighbourhood, 37 miles NNW. of Cosenza. Pop. 8259.

Morar. GWALIOR.

Morat (Ger. *Murten*), a town of 2364 inhabitants, in the Swiss canton of Freiburg, 12 miles ESE. of Neuchâtel and 48 by rail NNE. of Lausanne, lies on the Lake of Morat (3½ by 2 miles, 1428 feet above sea-level). Here, on 22d June 1476, the Swiss gained a victory over Charles the Bold, Duke of Burgundy.

Morata, OLYMPIA, a 16th-century scholar, was born at Ferrara in 1526, the daughter of the poet Fulvio Pellegrino Morato (who died in 1547). Already in her sixteenth year she gave public lectures in her native city; but, having in 1548 married the German physician Andreas Grundler, she followed him to Germany and became a Protestant. Driven from place to place by the religious wars, and reduced to penury, she died at Heidelberg, 26th October 1555, leaving numerous Latin and Greek poems, mainly on religious subjects (edited 1558, 1870, &c.), a treatise on Cicero, dialogues, letters, &c. See the Monograph by Bonnet (4th ed. Paris, 1865).

Moratin, LEANDRO FERNANDEZ DE, comic poet, was born at Madrid, March 10, 1760, and was the son of a poet. In 1790 appeared his first and best comedy, *El Viejo y la Nina;* it was followed by *La Comedia nuova*, *El Baron*, *La Mogigata*, and *El si de las Niñas*. Godoy conferred several ecclesiastical benefices upon him; Joseph Bonaparte made him chief royal librarian; but after 1814 he took refuge in Paris. He died in Paris, June 21, 1828.

Morava. See MARCH (river).

Moravia (Ger. *Mähren*), a crown-land of the Austrian empire, is bounded NE. by Silesia, SE. by Hungary, S. by Lower Austria, and NW. by Bohemia. Area, 8579 sq. miles; pop. (1870) 2,017,274; (1880) 2,153,407. It is enclosed on all sides by mountains, being separated from Silesia by the Sudetes, from Bohemia by the Moravian chain, and from Hungary by the Carpathian Mountains; while branches of these various chains intersect the whole country except in the south, where there are extensive plains rising to about 800 feet. Numerous small rivers flow south-east, and fall into the March or Morava, from which the country derives its name, and which joins the Danube. The Oder rises among the mountains on the north-east, and soon leaves the country. Moravia is essentially an agricultural region. On the whole the soil is rich, 56 per cent. being cultivated and 14 meadows and grass, and the temperature is more genial than in other European countries lying on the same parallel. The principal crops are rye and oats; then come barley, wheat, potatoes, beet-root, leguminous plants, and many fruits and vegetables. The breeding of all the usual varieties of domestic animals is actively prosecuted. The principal mineral products are coal and iron, with some graphite. The principal branches of industry are the manufacture of woollen, linen, and cotton goods, and beet-root sugar. Silk-weaving, lace-making, iron-founding, tanning, brewing, distilling, and the manufacture of chemicals, glass, paper, tobacco, and furniture also flourish. Brünn (q.v.), the capital, is the chief emporium for the manufactures, and Olmütz (q.v.) the principal cattle-mart. The former university at Olmütz is now represented by a theological faculty, and by a large technical institute at Brünn. The majority (95 per cent.) of the people belong to the Church of Rome. By nationality 70 per cent. are Slavs (Czechs and Moravians) and 29 per cent. Germans.

Moravia was anciently occupied by the Quadi, who were succeeded after the 5th century by the Rugii, the Heruli, and the Longobardi, and finally in the 6th century by the Slavonians. Charlemagne brought the people under nominal subjection. Christianity was first established in the middle of the 9th century by Cyril (q.v.) and Methodius. In 871 its ruler was made a duke by

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the emperor; he subdued the Bohemians and incorporated their country with his own. From 1029 it was associated with Bohemia, and at the close of the century was erected into a margraviate, and declared a fief of Bohemia, to be held from the crown by the younger branches of the royal house. On the death of Lewis II. at the battle of Mohacz in 1526, Moravia, with all the other Bohemian lands, fell to Austria, in accordance with a pre-existing compact of succession between the reigning dynasties. In 1849 it was formally separated from Bohemia, and declared a distinct province and crown-land. See Dudik, *Mährens allgemeine Geschichte* (11 vols. 1860–86).

Moravians, otherwise known as Herrnhuters, The Church of the Brethren, or The Unity of the Brethren, are a small body of Protestants who claim to be the modern representatives of the ancient church of the Bohemian Brethren (see BOHEMIA), or *Unitas Fratrum*, which first took a definite shape in 1467, when the followers of Peter of Chelczicky, a pious layman and a contemporary of Huss, formed themselves into a separate ecclesiastical community on the apostolic model. They held that all Christians should lay aside distinctions of rank, abstain from military service and the use of oaths, and live in literal accordance with the teaching of Christ. These views forced them to keep aloof from both sections of the Hussites proper, and, though there may have been Waldenses amongst them, they owed very little at any period of their history to these crypto-Protestants. At the synod of 1467 three elders, a bishop, and two presbyters were chosen by lot, and received ordination probably from a Waldensian priest, though the first beginnings of the church are wrapped in a mist of confused traditions and miraculous tales. Under the influence of Lucas of Prague, a man of strong character and great literary talent, the Brethren in 1494 abandoned their levelling ideas, but maintained their stern and rigid discipline, and by the beginning of the 16th century there were between 300 and 400 churches in the Unity. They had much friendly intercourse with Luther, but stood out for the celibacy of the clergy, the doctrine of works, and congregational purism. For a time, however, the Unity was under the influence of Lutheran ideas, though the Brethren had naturally a much stronger sympathy with Calvinism. From the commencement of its history times of persecution alternated with times of repose, and many of the Brethren, especially in the early part of the 16th century, were forced to flee to Poland and Prussia. In 1570 the Polish branch united with the Reformed Church, and, though in 1600 the Bohemian and Moravian branches included two-thirds of the population and most of the nobility, the Brethren having got mixed up with the revolution which ended so disastrously in 1620, by 1627 the church was entirely broken up and destroyed. In 1722 some of the Moravian descendants of the suppressed Unity, who had been roused by the preaching of a carpenter, Christian David, a converted Roman Catholic, resolved to emigrate, and were allowed by the pious young Count Zinzendorf (1700–60) to settle on a part of his property in Saxony, close to the Austrian frontier. The first company consisted of two brothers, their wives, four children, two relations, and David, but these were soon joined by other emigrants from Moravia and Bohemia, and by pious and fanatical people of various nationalities. Five years later the settlers at Herrnhut ('The Lord's Keeping') amounted to over three hundred. They at first attended the parish church, but soon began to quarrel among themselves and with the Lutheran pastor, and adopted wild and extravagant views. Owing to the exertions of Zinzendorf peace was restored, and the settlers formed themselves into a society in communion with the Lutheran Church, and drew up certain rules for their guidance in all matters of religion and conduct, the chief of these being that all in Herrnhut should live in love with all their brethren and with all the children of God in all religions.

Twelve elders were chosen to be the teachers and overseers of the community, and these came to be assisted afterwards by male and female 'labourers' of all sorts, including 'inspectors' of spiritual nuisances, and even of the work done and the goods sold by the Brethren. August 13th of this year (1727) is still celebrated as the spiritual birthday of the renewed church. By 1733 the Society had become a distinct church, and in 1735 the first bishop was elected and was ordained by Jablonski, court chaplain in Berlin, one of the two surviving guardians of the precious apostolical succession, which had been handed down by Amos Comenius, the last bishop of the old Unity. Although the Moravians imitated certain parts of the constitution and practice of the original church, much of what was peculiar in their views and discipline is to be traced to Zinzendorf, who was consecrated bishop in 1737, and was their 'advocate' until his death in 1760. The members of the community were divided into 'bands,' which met to exchange experiences, to study the Bible, to sing and pray, and there was a special division, still maintained, into 'choirs,' which consisted respectively of unmarried men, unmarried women, married couples, widowers, widows, boys and girls. Some of the 'choirs' had their own houses, where the members lived under the direction of a brother or sister. There were two daily services in which all joined, and hourly prayer was kept up night and day by certain members of the bands, while every morning the Brethren were supplied with a text as a 'watchword.' Love-feasts were introduced by Zinzendorf, and are still held, though the practice of feet-washing before the communion has been abandoned. All important matters, even marriage, were decided by an appeal to the 'lot,' and, as Zinzendorf taught that death was a joyous journey home, the departure of a brother or sister was announced by blowing a trumpet, each 'choir' having its own peculiar air.

Various branch settlements were established in Germany, America, and Britain, and in these the Herrnhut arrangements were strictly carried out; but, when this was not possible, congregations were set up, or societies were created, composed of members of other Protestant churches, as Brethren might belong to either of the three 'tropes'—the Lutheran, the Reformed, or the Moravian. These 'diaspora' societies contain at present 70,000 members, and the German 'diaspora' mission is the most important part of the home-work of the Brethren. Some of the Moravians came into contact with the Wesleys and Whitefield, and had considerable influence on their views, and they were even patronised by Anglican dignitaries, but partly owing to misrepresentation and partly owing to injudicious conduct on the part of some of the Brethren, their use of certain foolish hymns and sensuous and grotesque language in reference to the wounds of Christ, bitter opposition was roused against them both in England and the Continent. Since the middle of the 18th century the home-history of the Unity has been uneventful.

At present the executive government of the church is vested in the Elders' Conference of the Unity, a clerical body composed partly of bishops and partly of presbyters. This conference carries out the injunctions of the synod, the supreme court of the church, which meets every ten

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years at Herrnhut. At the meeting in 1889, a synodal resolution was passed practically abolishing the use of the lot. There are also provincial synods and conferences, and each congregation is governed by its own Elders' Conference, which consists of all the male and female 'labourers.' The bishops, of whom there are eighteen, enjoy no special privileges in the way of rank or salary, but have the sole power of ordaining. The ordinary church service is largely liturgical, and hymn-singing has always been a prominent feature of Moravian worship. The Moravians have no formal confession, though at an early period they declared their adhesion to the Augsburg Confession, and the litany which is used on Easter Sunday and two other Sundays is really a creed. The Unity is divided into three provinces: the British, with 38 congregations and 5408 members; the German, with 27 congregations and 8374 members; and the American, with 66 congregations and 17,848 members. At Ayr, in Scotland (the birthplace of James Montgomery), there is a congregation with 65 members. The Moravian Church has all along been distinguished for its missionary and educational activity, and is *par excellence* the missionary church of Christendom. The first mission, that to the West Indian slaves, was started in 1732, and soon after stations were established in Greenland (q.v.), Lapland, North and South America, South Africa, and other countries, and enthusiastic Brethren tried even to convert the Gypsies. At present the church has 111 stations with 22 filials, served by 343 missionaries and 1659 native assistants, who minister to 29,971 communicants and 55,835 baptised adults, and carry on 232 schools with 19,794 scholars. The Moravians have also had an important leper mission in Jerusalem since 1867. The actual annual expenditure is about £50,000. The Brethren have 12 boarding and 13 day schools in Britain, with 1810 pupils; 20 boarding and 22 day schools in Germany, with 2769 pupils; and 4 schools in America, with 500 pupils.

See histories of the Brethren by Holmes (1828), Schweinitz (1885), Bost (1848; and Eng. trans.); and in German by Gindely (1868) and Goll (1882); on their constitution, by Seifferth (1866); on their missions, by Thompson (1883), and in German, by Reichel (1874); also *Moravian Schools and Customs* (1889); besides the numerous German lives of Zinzendorf (1772–1888).

Moray, JAMES STUART, EARL OF, by Protestants called the 'Good Regent,' was the natural son of James V. of Scotland, by Margaret, daughter of John, fourth Lord Erskine, whom James in 1536 thought seriously of marrying, even though she had already wedded Sir Robert Douglas of Lochleven. Born about 1533, in 1538 he was made prior *in commendam* of St Andrews, in 1556 joined the Reformers, and almost immediately became the head of the Protestant party in Scotland. In 1561 he was despatched to France to invite his half-sister, Queen Mary, to return to her kingdom; and on her arrival he acted as her prime-minister and chief adviser. In 1562 she created him Earl of Mar; but that earldom being claimed by Lord Erskine, the title of Earl of Moray was in 1564 conferred instead on Lord James, who had meanwhile put down the Border banditti, and defeated Huntly at Corrichie. Strongly opposed to the marriage of Mary to Darnley (1565), he is falsely alleged before it to have endeavoured to seize the pair near Lochleven; and after it he openly appealed to arms, but was easily put to flight by the queen, and forced to take refuge in England. He did not return to Edinburgh till 10th March 1566, the day after Rizzio's murder, to which he was certainly privy. In April 1567 he withdrew to France, but in the following August was recalled by the nobles in arms against Mary, and found her a prisoner at Lochleven, and himself appointed regent of the kingdom. In his famous interview with the queen on the 15th he 'behaved himself rather like a ghostly father unto her than like a counsellor.' On Mary's escape, he defeated her forces at Langside, near Glasgow (13th May 1568), and afterwards was one of the commissioners sent to England to conduct the negotiations against her. He then, as always, acted with extreme wariness; and after his return to Scotland by his vigour and prudence he succeeded in securing the peace of the realm, and settling the affairs of the church. But on 20th January 1570 he was shot at Linlithgow by James Hamilton of Bothwellhaugh, who was instigated thereto by Mary's adherents, and prompted also, it may be, by personal enmity. He was buried in St Giles's, Edinburgh. Of his ambition there can hardly be question; still, the most different estimates have been formed of his character, according to men's estimates of Mary. See MARY QUEEN OF SCOTS, and works there cited.

Moray Firth, an indentation of the German Ocean, on the north-east coast of Scotland, measuring 21 miles across its entrance from Tarbet Ness, in Ross-shire, to Stotfield Head, near Lossiemouth in Elginshire, and 39 miles thence to the mouth of the river Beauly. The name is sometimes applied in a wider sense to the whole extent of sea between Kinnaird's Head in Aberdeenshire and Duncansbay Head in Caithness.

Morayshire. See ELGINSHIRE.

Morbihan, a maritime department of France, formed out of ancient Brittany, with the Atlantic on the south and Finistère on the west. Area, 2624 sq. m.; pop. (1872) 490,352; (1886) 535,256. The coast is much indented, and has a multitude of bays, promontories, harbours, and islands. The largest island is Belle Isle (q.v.). The department forms a plateau of no great elevation, partly cultivated, partly occupied by extensive tracts of heath and marsh (see BRITTANY). Morbihan is divided into the four arrondissements of Vannes, L'Orient, Ploermel, and Pontivy. The chief town is Vannes (q.v.), but the most populous is L'Orient (q.v.). Many ancient customs still prevail in Morbihan; communal proprietorship survives there, and in some of the islands the *curé*, assisted by a council of notables, governs the people in a patriarchal fashion.

Mordants. See DYEING.

Mordaunt, CHARLES. See PETERBOROUGH.

Mordvins, a Finnic race, now however greatly intermingled with the Russians, who dwell along the middle course of the Volga, from the government of Nijni-Novgorod to that of Samara. They number about 790,000.

More, HANNAH, was the fourth daughter of the village schoolmaster of Stapleton, near Bristol, where she was born in 1745. As a child she showed great quickness of apprehension and a good memory. Her sisters were sent to a school in Bristol, and when the eldest was twenty-one they opened a boarding-school there, to which Hannah went when she was twelve years old. She wrote verses at an early age, and in 1762 she published *The Search after Happiness*, a pastoral drama. In 1773 she went on a visit to London, and was introduced to the Garricks, and by them to Dr Johnson, Burke, Sir Joshua Reynolds, and the best literary society of London. During this period of her life she wrote two tales in verse, and two tragedies, *Percy* and *The Fatal Secret*, both of which were acted. While in London she went a great deal into society, but gradually found this mode of life to be unsatis-

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factory, and was led by her religious views to withdraw from it. After the publication of her *Sacred Dramas*, she retired to Cowslip Green, a cottage near Bristol, where she did much to improve the condition of the poor in her neighbourhood by establishing schools for their instruction. She still continued her literary work, and helped by her writings to raise the tone of English society. Her essays on *The Manners of the Great* and *The Religion of the Fashionable World* (a pamphlet on *Village Politics*), her novel *Cœlebs in Search of a Wife*, and a tract called *The Shepherd of Salisbury Plain* are some of the most popular of her works. In 1828 she moved from Barley Wood, a house she had built for herself near Cowslip Green, and took up her abode at Clifton, where she died, September 7, 1833. See the Life by Roberts (2 vols. 1838), and the short Life by Miss Yonge (1888).

More, HENRY, one of the Cambridge Platonists, was born at Grantham in Lincolnshire in 1614. He was educated at Eton and Christ's College, Cambridge, revolted early against the Calvinism of his parents, and gave himself entirely to philosophy, especially to Plato and more particularly the Neoplatonist writers. He took his Bachelor's degree in 1635, his Master's in 1639, when he was elected fellow of his college. Here he remained all his life, nor could he be prevailed upon to accept church preferment. He lived in an atmosphere of unusual spiritual elevation, and exercised a great influence on the young men that gathered round him. Among his pupils was a young lady of family who became Viscountess Conway, and at whose seat of Ragley in Warwickshire More often stayed. This lady's sympathies with the mystic and the occult extended also to Van Helmont and Valentine Greatrakes, and she ultimately found rest among the Quakers. More's earlier rationality gradually gave place to hopeless mysticism and theosophy, and his successive works decline correspondingly in value. He died September 1, 1687, and was buried in the chapel of his college. His *Divine Dialogues* (1668) is a work of altogether unusual interest. His *Opera Theologica* were collected in 1675, his *Opera Philosophica* in 1678. See the Life by Richard Ward (1710), and Tulloch's *Rational Theology in England in the Seventeenth Century* (vol. ii. 1874).

More, SIR THOMAS, was born in Milk Street, London, in 1478. His father, who subsequently became Sir John More, Justice of the Queen's Bench, was a man of character and talent, with a high sense of parental responsibility. More received his first instruction in Latin, then the basis of all education, in one of the most famous English schools of the time—that of St Anthony, Threadneedle Street, London. In after-life More wrote Latin with all the facility, though not with the classical purity, of the best Italian scholars of the Revival of Learning. When he attained his fifteenth year his father, after the fashion of the time, placed him as page in the household of Archbishop Morton, to whose virtues More afterwards paid the highest tribute in his *Utopia*. Morton, on his side, formed the highest expectations of More, and was in the habit of saying to the nobles who dined with him: 'This child here waiting at the table, whosoever shall live to see it, will prove a marvellous man.'

By Morton More was sent to Oxford, where the Renaissance was now represented by such men as Colet and Linacre, both of whom had travelled and studied in Italy. From Linacre he appears to have learned Greek, and from Colet he received a spiritual impulse which gave a direction to his entire life and opinions. From Colet More also learned those novel methods of biblical interpretation which Colet himself may have learned from Savonarola in Florence. By his acquaintance with the classics therefore, and by his enlightened views regarding the theology and the traditions of the church, More was emphatically a man of the new order. When, some time after leaving Oxford (probably about 1498), he first met Erasmus, both at once felt that they were in entire sympathy on all the deepest questions of the time.

It was his father's wish that he should follow the same profession as himself. Having completed his legal studies, first at New Inn and afterwards at Lincoln's Inn, he acted for three years as reader in Furnival's Inn. It marks the religious basis of More's character that he spent the next four years in the Charterhouse of London in 'devotion and prayer.' By his marriage with the eldest daughter of Mr Colte, a gentleman of Essex, he definitively made choice of a secular career. During the last years of Henry VII. he became under-sheriff of London and member of parliament, in which latter capacity he gave serious offence to the king by protesting against the excessive dowry demanded by Henry from parliament on the occasion of his daughter's marriage with James IV. of Scotland.

On the accession of Henry VIII. (1509) a brilliant prospect was opened up to More. It was Henry's ambition to surround himself with men of genius and accomplishments; and More had by this time attained a European reputation in the world of learning. As ambassador on two occasions to the Low Countries he had also given proofs of his tact and capacity for business. More, however, had little inclination for public life, and it was only after much hesitation that he took service under Henry. Introduced to the king through Wolsey, he rose rapidly in dignity and in the royal favour. He became Master of Requests (1514), Treasurer of the Exchequer (1521), and Chancellor of the Duchy of Lancaster (1525). For a time the king showed him every mark of personal attention—paying him unexpected visits at his house in Chelsea 'to be merry with him.' Congratulated on these marks of favour by his son-in-law Roper, More, who had divined Henry's real character from the first, replied: 'If my head would win him a castle in France it should not fail to go.' As speaker of the House of Commons (1523), More, on the occasion of Wolsey's demand for a subsidy of which the House disapproved, received the great cardinal in a manner that made him exclaim: 'Would to God you had been at Rome, Mr More, when I made you speaker.' More, however, still continued to enjoy Henry's favour; and on two occasions was sent on missions of importance to Francis I. and the Emperor Charles V.

On the fall of Wolsey in 1529, More, against his own strongest wish, was appointed to the office of Lord Chancellor. Seeing from the first where the king's divorce from Catharine of Aragon must eventually lead, he knew that only one fate could be in store for himself. In the discharge of his office he displayed a primitive virtue and simplicity, being 'ready to hear every man's cause, poor and rich, and keep no doors shut from them.' The one stain on his character as judge is the harshness of his sentences for religious opinions. In passing such sentences More acted only in the spirit of the time; but in his *Utopia* he had shown the clearest conception of the sacredness of the individual conscience. 'The Utopians,' he says, 'put the unbelievers to no punishment, because that they be persuaded that it is in no man's power to believe what he list.' More sympathised with Colet and Erasmus in their desire for a more rational theology and for radical reform in the manners of the clergy, but like them also he had no promptings to break with the historic church. He could look only with

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displeasure, therefore, on the successive steps which led Henry to the final schism from Rome. In 1532 he resigned the chancellorship, and retired into private life. The disapproval of his policy by such a man as More could not be disregarded by Henry, and various attempts were made to win him over. Nothing, however, could shake the constancy of More, and his death became a mere matter of time and policy. The opportunity came in 1534. In that year Henry was declared head of the English Church; and More's steadfast refusal to recognise any other head of the church than the pope led to his sentence for high-treason after a harsh imprisonment of more than a year. The manner in which he met his death, while it is one of the commonplaces of English history, strangely illustrates an inveterate habit of his nature—the disposition to jest with the most serious questions and on the most momentous occasions. As, on 7th July 1535, he mounted the scaffold he exclaimed to a stander-by: 'Friend, help me up; when I come down again I can shift for myself;' and raising his head after it had been laid on the block, he bade the executioner stay till he had put aside his beard, 'for,' said he, 'it never committed treason.'

More was twice married; but only by his first wife had he any family. In no life of More should his daughter Margaret, the wife of his biographer Roper, pass unmentioned. By her high character and accomplishments, but above all by her pious devotion to her father, she holds a place among the illustrious women of English history.

One of the distinguished characters in the political history of England, More also ranks high in the history of its literature. By his Latin *Utopia* (1516; Eng. trans. 1556) he takes his place with the most eminent humanists of the Renaissance, and he was the one literary Englishman of the 16th century well-known and admired on the Continent. In his *History of King Richard III.* (1513) he produced what may be regarded as the first book in classical English prose. In his personal character More was the most attractive and lovable of men; and his tragic end gave the crown to the moral beauty of his life. From Erasmus's sketch of him we realise all his virtues and all his attractions; but realise also that he was a winning rather than an imposing figure. He had ingenuity rather than insight; not infrequently his wit passed into levity and even into flippancy; and there was in his character a strain of morbidness and superstition which precluded him from the largest and humanest views of men and things. In 1886 he was beatified.

See Roper, *Life of Sir Thomas More* (first printed 1626); Lord Campbell, *Lives of the Chancellors;* Mackintosh, *Lardner's Cabinet Encyclopædia;* Seebohm, *Oxford Reformers;* D. Nisard, *Renaissance et Réforme;* also works cited at HENRY VIII., WOLSEY, and FISHER.

Morea, the name borne since the middle ages by the ancient Peloponnesus (q.v.) of Greece. Several theories have been proposed of the origin and meaning of the word. It is usually said to be derived from *morus*, 'a mulberry'—the outline of the peninsula bearing a resemblance to the leaf of that tree; others, however, such as Fallmerayer, trace it back to the Slavonic *more*, 'the sea,' which nearly encircles the Morea. After being overrun by the Goths and Vandals, it became a prey, in the second half of the 8th century, to Slav invaders, who were gradually subdued and civilised by the Byzantine emperors. In 1205 the peninsula was conquered by the Normans, who formed its western portion into a feudal principality subject to the crown of Sicily. Michael VIII. Palæologus reconquered the country after 1261; but the principality of Achaia remained in the family of Villehardouin till 1346, when the male line became extinct. Various claimants now arose, and much strife and confusion ensued. At length, in 1461, the greater portion of the Morea fell into the hands of the Turks, the remainder being held by Venice, who abandoned it in 1540. Venice reconquered the Morea in 1684, but again lost it to the Turks in 1714. For its later history, see GREECE.

Moreau, JEAN VICTOR, the greatest general of the French Republic, except Bonaparte, was born, 11th August 1761, at Morlaix, in Brittany, the son of an advocate, and was sent to study law at Rennes. On the outbreak of the Revolution he was chosen to command the volunteers from Rennes, served under Dumouriez in 1793, and displayed such military talent that in 1794 he was made a general of division; he took an active part in reducing Belgium and Holland under Pichegru in that and the following year. When Pichegru fell under suspicion, the Directory appointed Moreau, in the spring of 1796, to the chief command on the Rhine and Moselle. He crossed the Rhine at Kehl, defeated Latour at Rastatt and the Archduke Charles at Ettlingen, and drove the Austrians back to the Danube. But, owing to the defeat and retreat of Jourdan, he was obliged to make a desperate effort to regain the Rhine, which he accomplished, notwithstanding great difficulties, in a retreat that established his reputation for generalship more than all his previous victories. A suspicion of participation in the plots of Pichegru led to his being deprived of his command after the *coup d'état* of 18th Fructidor. In the following year (1798) he succeeded Schérer in the command of the army in Italy, which was hard pressed by the Russians and Austrians. By a retreat conducted with consummate skill, he saved the French army from destruction. The Directory, nevertheless, deprived him of the chief command, and gave it to Joubert. But Moreau remained with the army at Joubert's request to be present at the battle of Novi. Early in the engagement Joubert was killed and Moreau again assumed the command, and conducted the defeated troops to France. The noble disinterestedness of Moreau's character, his military talent, and his political moderation induced the party of Sieyès, which overthrew the Directory, to offer him the dictatorship of France; he declined it, but lent his assistance to Bonaparte on 18th Brumaire. Receiving the command of the army of the Rhine, Moreau gained victory after victory over the Austrians in the campaign of 1800, drove them back behind the Inn, and at last won the great and decisive battle of Hohenlinden (q.v.). A strong feeling of jealousy against Moreau now took firm root in Napoleon's mind. He accused his rival of participation in the plot of Cadoudal (q.v.) and Pichegru against his life, had him arrested, brought to trial, and found guilty on insufficient evidence, 9th June 1804. A sentence of two years' imprisonment was pronounced; Napoleon commuted it into banishment, and Moreau went to America, and settled in New Jersey. There he remained until 1813, when he accompanied the emperor of Russia and the king of Prussia in the march against Dresden. Fortunately for his fame he did not live to invade his country, for here, as he stood talking to the Emperor Alexander on 27th August, a French cannon-ball broke both his legs. Amputation was performed, but he died at Laun in Bohemia, 2d September 1813. He was buried in St Petersburg. See the studies by C. Jochmus (Berl. 1814) and A. de Beauchamp (trans. Lond. 1814).

Morecambe Bay, an inlet of the Irish Sea, separates the main portion of Lancashire from the detached portion of Furness. It is about 10 miles in average breadth and 18 miles in length, and

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receives the Leven, the Kent, and the Lune. The depth of water in the bay is never great except in the channels of the rivers.

Moreen. See MOIRE.

Morel (*Morchella*) is a genus of Discomycete fungi, of which a number of species (*M. esculenta, deliciosa, bohemica*, &c.) are commonly eaten fresh and preserved in central and southern Europe. In Germany the morel is so highly prized that, as it often springs up where trees have been burned, the forests were often destroyed for its sake, till this had to be restrained by severe penalties.

Morelia, capital of the Mexican state of Michoacan, is situated, among gardens and orchards, in a valley 6400 feet above sea-level, 115 miles (234 by rail) W. by N. of Mexico city. It contains a cathedral and seminary, and manufactures cotton, tobacco, and candles. Morelia, which from 1541 to 1828 was called Valladolid, was the birthplace of the patriot Morelos, in whose honour the name was changed, and of Iturbide, the short-lived emperor of Mexico. Pop. 25,000.

Morella, a town of Spain, 80 miles N. by E. of Valencia, was the stronghold of Cabrera, the Carlist general, who scaled the castle on 25th January 1839. It was retaken in July 1840 by Espartero. Pop. 7190.

Morepork. See PODARGUS.

Moreri, LOUIS (1643–80), was born in Provence, took orders, and was for five years a noted preacher at Lyons, where in 1674 he published *Le Grand Dictionnaire Historique, ou le Melange Curieux de l'Histoire sacrée et profane* (in 1 vol. folio). In 1675 he went to Paris, and laboured at the expansion and improvement of this important work till his death. The best edition is the 20th (Paris, 1759), in 10 vols. folio. It was translated into Spanish, Italian, and English, Jeremy Collier adding to this an appendix or supplement filling a folio volume. The geographical and historical articles have become obsolete, but the biographical part is still valuable.

Moresnet, a small neutral territory between Belgium and Prussia, 5 miles SW. of Aix-la-Chapelle, and containing about 70 acres. There is on it a village of 3000 inhabitants.

Moreton Bay, on the east coast of Queensland, Australia, is formed inside the islands of Moreton and Stradbroke, the former 20 miles and the latter 33 miles in length, and both about 5 miles in greatest breadth. The bay is 40 miles long by 17 broad; its southern half is dotted with islands and sandbanks. It receives the six considerable streams, Nerang, Pimpama, Logan, Brisbane, Pine, and Caboolture. The entrance at the north end is practicable at all times for vessels of the largest size; the entrance between Moreton and Stradbroke Islands is narrow, and less safe.

Moreton-bay Chestnut, a genus of plants so named because of the supposed resemblance in form and qualities of the seeds to the sweet chestnut of Europe. *Castanospermum australe* is the only species of the genus known. It belongs to the sub-order Papilionaceæ of the natural order Leguminosæ, and is a native of Queensland, Australia. The tree grows to the height of from 70 to 100 feet, with spreading branches clothed with pinnate leaves about a foot long. The flowers —bright yellow, and red—are succeeded by cylindrical pendulous pods of a bright brown colour, 6 to 8 inches long generally, containing about four seeds each, which are roundish but somewhat flattened on one side. Though likened to the sweet chestnut, they are much inferior in delicacy of flavour, being very astringent; but they are somewhat improved when roasted.

Morgagni, G. B. (1682–1771), founder of pathological anatomy and professor at Padua. See ANATOMY.

Morgan, MOUNT. See MOUNT MORGAN.

Morgan, AUGUSTUS DE. See DE MORGAN.

Morgan, HENRY. See BUCCANEERS; also J. C. Hutcheson, *Sir Henry Morgan* (1890), and Howard Pyle, *The Buccaneers and Marooners of America* (1891).

Morgan, LADY, novelist, was born (Sydney Owenson) in Dublin on the Christmas-day of 1780 or thereby—'cold, false, erroneous, chronological dates' she protests against. Her father, a theatrical manager, fell into difficulties; and the clever, bold, lively young woman resolved to support the fortunes of the family, first as governess, afterwards as author. She had had 'somewhat mysterious relations' with at least one admirer, Sir Charles Ormsby, when in 1812 she was married off-hand to Thomas Charles Morgan, M.D. (1783–1843), whom the Lord-lieutenant knighted for the occasion. For the next quarter of a century, excepting two long visits to the Continent, the pair made Dublin their home; but in 1837 Lord Melbourne gave her a pension of £300, and next year they removed to London. Here she died on 16th April 1859, having continued busy with her pen and her tongue to the last. Her twenty-two works—rattling novels, verse, travels, &c.—include *St Clair* (1804), *The Wild Irish Girl* (1806), *O'Donnel* (1814), *France* (1817), and *Italy* (1821). Her silly but not unamusing *Memoirs* were edited by Hepworth Dixon (2 vols. 1862).

Morgan, LEWIS HENRY, an American archæologist, was born at Aurora, New York, 21st November 1818, graduated at Union College in 1840, and became a lawyer at Rochester. He served in the state assembly (1861) and senate (1868), and died December 17, 1881. Morgan's earliest work, *The League of the Iroquois* (1851), was the first account of the organisation and government of an Indian tribe; but even more valuable are his *Systems of Consanguinity and Affinity of the Human Family* (1869), and his treatise on *Ancient Society* (1877). He also published *Houses and House-life of the American Aborigines* (1881), and an account of the beaver.

Morgana, FATA. See FATA MORGANA.

Morganatic Marriage (perhaps from Goth. *morgjan*, 'to limit;' perhaps Ger. *morgengabe*, a gift given by the husband to the wife after marriage; Littré suggests *morgen*, 'morning'—a wedding celebrated privately in the morning), sometimes called *Left-handed marriage*, a lower sort of matrimonial union, which as a civil engagement is completely binding, but fails to confer on the wife the title or fortune of her husband, or on the children the full status of legitimacy or right of succession. In Germany it came in very early times to be accepted as a principle that *Ebenbürtigkeit*, or equality of birth between husband and wife, was essential to a proper marriage. The lower nobility were of course not *Ebenbürtig* with the higher nobility, nor the best born commoners with the lower nobility. Now the rule only concerns reigning houses and the higher nobility. But still members of German princely houses entering into marriages of this kind with their inferiors in rank (as frequently happens) contract merely morganatic unions. The marriage, for instance, in 1851 of Prince Alexander of Hesse to the Countess Julie von Hauke, from which sprang the Battenberg family, was a morganatic one. Handfasting (q.v.) in Scotland had a certain resemblance. The Royal Marriage Act, 12 Geo. III. chap. 11, reduces to a position somewhat like that of morganatic unions

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every marriage in the royal family of Great Britain not previously approved by the sovereign under the Great Seal, provided the prince entering into it is under twenty-five, and every such marriage of a prince above twenty-five which is disapproved by parliament. Thus, peerages and most biography books make no mention of the Duke of Cambridge's marriage with Miss Featherstone, an actress; their children bear the name of Fitzgeorge. See ROYAL FAMILY.

Morgarten, a mountain slope on the east margin of Lake Egeri, in the canton of Zug, Switzerland, is the place where 1400 men of the Swiss Forest Cantons—Schwyz, Uri, and Unterwalden—won a great victory over 15,000 Austrians, November 15, 1315.

Morghen, RAPHAEL SANZIO CAVALIERE, a famous engraver, was born at Naples, June 19, 1758. His first instructor was his father, a mediocre engraver of German origin. But he gave such indications of talent that at the age of twenty he was sent to Rome to study under Volpato, then considered the best engraver in Italy, whose daughter he married in 1781. His progress was very marked, and even his first works obtained great success. Raphael's celebrated figures in the Vatican of 'Poetry' and 'Theology' were engraved by him in 1781; and he afterwards produced a succession of engravings of a very high class from many of the masterpieces of art: amongst these may be mentioned Raphael's 'Madonna della Seggiola' and the 'Transfiguration;' the 'Madonna del Sacco,' by Andrea del Sarto; the 'Duke of Moncado,' by Van Dyck; and by his burin, Da Vinci's 'Last Supper,' notwithstanding its decay, has been rendered with such consummate skill as to lessen the regret felt for the evanescent condition of the original work. He accepted an invitation from the grand-duke to reside at Florence, with a pension of 400 scudi and a free residence, under condition of establishing a school of engraving; and he received marked attentions from the Emperor Napoleon, to whom in 1811 he dedicated his engraving from the 'Transfiguration,' the grand result of sixteen years of labour. He died at Florence, April 8, 1833. His Life, with a portrait and catalogue of his works to the number of 254, was published by his pupil, Niccolo Palmarino. The works of Morghen will always hold a very prominent place in the history of Engraving (q.v.). See Fred. R. Halsey, *Raphael Morghen's Engraved Works* (New York, 1885).

Morgue, a building in Paris, just behind the cathedral of Notre Dâme, where the dead bodies of persons unknown, found either in the river (Seine) or in the streets, are exposed to public view for three days. The corpses are put under a glass case, on sloping slabs of marble. When a corpse is identified, it is handed over to the relatives or friends of the deceased, on payment of costs and dues; otherwise it is interred at the expense of the city. The number of bodies yearly exposed in the Morgue is about 300, of which five-sixths are those of males.—There are morgues in Berlin, and in Boston, New York, Brooklyn, Philadelphia, Chicago, and other American towns.

Moriah, MOUNT. See JERUSALEM.

Morier, JAMES, an English novelist, born in 1780, served from 1810 to 1816 at the court of Persia, first as secretary of legation, subsequently as envoy. In 1812 he published his *Travels in Persia, Armenia, and Asia Minor to Constantinople*, and in 1818 *A second Journey through Persia, Armenia, and Asia Minor*. The minute and familiar acquaintance he had acquired with the manners and customs of the Persians was seen in his highly-interesting series of eastern romances: *The Adventures of Hajji Baba of Ispahan* (3 vols. 1824), with its continuation, *Hajji Baba in England* (2 vols. 1828); *Zohrab* (1832); *Ayesha* (1834); and *The Mirza* (1841). His other novels are *Abel Allnut* (1837), *The Banished* (1839), and *Martin Tontrond* (1842). Morier died at Brighton 23d March 1849.

Morinus. Jean Morin, a French theologian (1591–1659), wrote on ecclesiastical antiquities, and ranks as one of the founders of biblical criticism mainly in virtue of his editions and notes on the Samaritan Pentateuch and the Targum (in the Paris Polyglott), and his *Exercitationes* on the Hebrew and Greek text of the Bible.

Morion, an iron or steel headpiece without visor. See ARMOUR.

Moriscos. Moriscos is the name usually given to the Moors who remained in Spain after the taking of Granada in 1492; Mozarabes or Muzarabes, to the Christian Spaniards who lived in the parts of Spain under Moorish rule; Mudejares, to the Moors who submitted to the Christians in the earlier periods of the re-conquest.

To take first the *Mozarabes*. Christianity was freely, if contemptuously, tolerated under the Moorish rule. Occasional outbursts of fanaticism used to take place. These were often provoked by Christians defiantly seeking martyrdom, as in Cordova in the 9th century; this persecution lasted intermittently till 953, when it well-nigh ceased. The Mozarabes kept their ancient liturgy, though many of them had ceased to understand Latin, and spoke and wrote Arabic only, writing even Latin and Spanish with Arabic characters. They occasionally held councils, but indifference prevailed, and the Spanish conquerors were more astonished at the laxity of the Mozarabes than at their constancy in retaining their old faith. For Mozarabic liturgy, see LITURGY.

Mudejares.—Moorish names appear first in the 9th century as inhabitants of the country, and witnesses to documents, under Spanish rule. One of the earliest capitulations or fueros granted to them is that of Huesca (1081); by this and subsequent fueros (Tudela, 1115, &c.) the widest toleration was extended to them; they were allowed full exercise of their religion, laws, language, dress, and customs. The fuero of Jativa granted by Jaime I. of Aragon (1251) even provides that if any Saracen should become a Christian he should lose his landed property; that of Siliebar, near Seville (1255), allows them to build a castle for their defence. These capitulations seem to have been fairly observed till the 14th century, when a change of tone becomes apparent. In 1301 the Moors of Aragon were compelled to wear a distinctive dress, and in the next century their privileges were greatly curtailed; recantation was forced upon them. The Mudejares of Aragon, Valencia, and Castile had hitherto been faithful, had served loyally in war even against Moors, had taken the royal side in all popular movements; even as late as 1528 they appealed to their well-proved loyalty to the crown.

But their situation was greatly impaired by the incorporation among them of the *Moriscos*, after the fall of Granada (1492). The terms of the capitulation of Granada were to the full as liberal as those under which the Mudejares had lived loyally in Aragon, Valencia, and Castile for three or four centuries. Under Talavera, the first Archbishop of Granada, some attempt was made to observe these conditions, and with happy results. But the bigotry of Cardinal Ximenes, violating the capitulation, led to a rising in the Alpuxarras (1500–2) and to the expulsion of the Moriscos of Castile and Leon; though in 1503 and in 1510

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Ferdinand forbade the expulsion of those of Aragon and Valencia. At the close of the rising in the Alpuxarras the alternative of exile or of baptism had been offered to the Moriscos. Those who chose exile went to swell the number of the Corsairs of Algeria and the Barbary States, who were henceforth a standing danger and annoyance to Spain. The newly-converted Moriscos (New Christians as they were called) became the objects of the severities of the Inquisition; as doubtful Christians they were regarded with greater jealousy and suspicion than as professed Mohammedans. Under danger of relapse their children were taken from them, and their young men sent to the galleys. In the war of the Germania in Valencia (1520) they were ruthlessly massacred by the populace, but were still faithful to the king and to the nobles who respected their privileges. The ever-increasing persecution provoked a still more serious rising under Philip II. in Granada. It was put down after two years of warfare by Don John of Austria (1568–70); many of the Moriscos, and especially the women, were given to the soldiers as slaves, and the rest, who did not emigrate, were removed to Castile, Valencia, and Murcia. The action of the Corsairs, avenging on Spain the wrongs of their fellow-countrymen, ruining the commerce, carrying off Christian captives, ravaging the coasts so that for leagues along the south-east it remained uncultivated, increased the bitterness against the Moriscos, who were suspected of being in league with the Corsairs, and directing their forays. Many returned openly to their ancestral faith; spasmodic attempts at genuine conversion proved fruitless; in 1599 the Archbishop of Valencia reported the conversion of one Morisco woman only as the result of a year's labour. Harsher measures were tried and failed; persecution only made them cling more firmly to their faith; partial expulsion only augmented the number of the Corsairs; and at last they were forbidden to leave the country by sea. The hatred, however, of Philip II. against the Protestants was stronger than his dislike of the Moriscos, and his reign is marked by constant vacillations in his policy towards them; and their lot cannot have been absolutely intolerable, for one charge against them was that their numbers increased continually while that of the old Christians diminished. The fear and suspicion aroused on both sides made it difficult for Spaniards and Moriscos, new and old Christians, to live together. After so many breaches of faith the Moriscos could trust no promise made to them by king or church. To the Spaniards it seemed intolerable to have an intestine foe, while the kingdom was so sorely pressed from without; and churchmen taught the king that anything, short of the extermination which he might commit with a safe conscience, was a mercy. In 1582 the total expulsion was first mooted; it was decided on in principle in 1599. In 1609–10 the whole of the Moriscos were expelled the kingdom, either by sea from Valencia, or through the Pyrenees from Aragon and Castile. All their goods were confiscated, except what they could turn into money, or carry with them on their persons; robbery, murder, assault, excesses of every kind against them marked their track; all their children under four years of age were taken from them to be brought up as Christians; over 500,000 Moriscos, chiefly agricultural labourers or farmers, left the country in which their people had dwelt for so many centuries. The results to Spain were like those which subsequently followed the emigration of the Huguenots from France. Even this does not end the story; the descendants of the children forcibly kept behind, or of those really converted to Christianity, were regarded with horror, and were constantly denounced to the Inquisition. For nearly a century afterwards we find decrees of particular provinces expelling families for being descendants of the Moriscos. A taint of Moorish blood was sufficient to prevent the holding of any public office, even in the smallest municipality.

See *Guerra de Granada*, by Diego de Mendoza; *Rebellion y Castigo de los Moriscos del Reino de Granada*, by L. del Marmol Carvajal (both in vol. xxi. of Rivadeneyrai's *Biblioteca de Autores Espanoles*); *Estado Social y Politico de los Mudejares de Castilla*, by F. Fernandez y Gonzalez (Madrid, 1866); *Condicion Social de los Moriscos de España*, by Florencio Janer (Madrid, 1857); *La Expulsion de los Moriscos Españoles*, by M. Danvila y Collado (Madrid, 1889).

Morison, COMMANDER. See ZADKIEL.

Morison, JAMES COTTER, author and Positivist, was born in 1831, and educated at Highgate grammar-school and Lincoln College, Oxford. His first work was his masterpiece, *The Life and Times of St Bernard* (1863). His latest, *The Service of Man, an Essay towards the Religion of the Future* (1886), attracted much attention, but it was commenced when sickness had already seized him, and it does not adequately represent his views. He was one of the founders and first proprietors of the *Fortnightly Review*. His intellectual gifts were associated with a most genial and kindly nature; he was reputed one of the best talkers of his time in French as well as English, and had long projected a work on the history of France, but owing to ill-health it was never fairly begun. He died February 25, 1888.

Morison, ROBERT, botanist, was a native of Aberdeen, born in 1620. Having borne arms as a royalist in the civil wars, he retired to France when his sovereign's cause collapsed, and took the degree of doctor at Angers (1648). Two years later he became superintendent of the garden formed at Blois by Gaston, Duke of Orleans. After the Restoration he was appointed by Charles II. one of his physicians, 'botanist royal,' and 'professor' of Botany at Oxford. He was knocked down by a coach in London, and died the following day, 10th November 1683. His chief work is *Plantarum Historia Universalis Oxoniensis* (1680).

Morisonianism. See EVANGELICAL UNION.

Morlaix, a picturesque and flourishing port of France, in the Breton department of Finistère, on the tidal Dossen, 6½ miles from the sea and 38 ENE. of Brest. It has many quaint timbered houses, a huge railway viaduct 207 feet high, and manufactures of tobacco, paper, &c. Vessels of 400 tons can reach the quays. Moreau was a native. Pop. (1872) 12,723; (1886) 14,174. See BERNARD OF MORLAIX.

Morland, GEORGE, painter, was born in London, 26th June 1763, the eldest son of Henry Morland, crayonist (1712–97), to whom at fourteen he was articled for seven years, and who brought him up with extreme rigour. No sooner, then, had he become his own master than he went hopelessly and utterly to the bad. His marriage in 1786 had no power to check him; and his whole after-life was a downward course of debt and dissipation. He was regular only in this, that 'every day he got thoroughly intoxicated, and then generally would lie all night long on the floor.' Yet he worked hard and rapidly, in the last eight years of his life turning out nearly nine hundred paintings and more than a thousand drawings. His strength lay in country subjects (pigs, Gypsies, and stable interiors); his sea-pieces, also numerous, are not so good. He died of brain-fever in a Holborn sponging-house, 29th October 1804. See his Life by G. Dawe (1807).

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Morley, a municipal borough in the West Riding of Yorkshire, 5 miles SW. of Leeds, with woollen manufactures, coal-mines, and stone quarries. Mentioned in Domesday, it became a borough only in 1885. Pop. (1851) 4821; (1881) 15,011.

Morley, HENRY, English author, was born in London, September 15, 1822, and educated at the Moravian School, Neuwied-on-the-Rhine, and King's College, London, where he edited the *King's College Magazine*. After practising medicine at Madely, Shropshire, from 1844 till 1848, and keeping school for the next two years at Liscard, Liverpool, he settled down with some reluctance in London to literary work in connection with *Household Words* and the *Examiner*. Of the latter he was joint-editor from 1856 to 1859, and sole editor from that year till 1864. He was English lecturer at King's College for eight years previous to 1865, when he became professor of English Language and Literature at University College, London, an office which he resigned in 1889. In 1889 he contributed the article on English Literature to this work. In 1870 he was appointed examiner in English Language, Literature, and History to the university of London. His numerous writings include *How to make Home Unhealthy* (1850); *A Defence of Ignorance* (1851); Lives of Palissy (1852), Jerome Cardan (1854), and Cornelius Agrippa (1856); *Memoirs of Bartholomew Fair* (1857), reprints of his essays in *Household Words;* two volumes of *Fairy Tales* (1859–60); *English Writers to Dunbar* (2 parts, 1864–66), worked up anew into the first 4 vols., 1887–89, of a projected complete history of English literature in 20 volumes); annotated editions of the *Spectator* (1868) and Boswell's *Life of Johnson* (1886); *Tables of English Literature* (1870); *Clément Marot and other Studies* (1871); *A First Sketch of English Literature* (1873); *Library of English Literature* (5 vols. 1876–82); and *Of English Literature in the Reign of Victoria* (1881). No man has done so much to make classical literature (both English and foreign through English translations) accessible to the people as Henry Morley through his admirable series, Morley's Universal Library, embracing 63 volumes at a shilling each (1883–88); Cassell's National Library, embracing 209 volumes at the price of threepence each (1886–90); and the Carisbrooke Library, a series of half-crown volumes issued in alternate months from September 1888.

Morley, JOHN, M.P., was born at Blackburn, 24th December 1838; he was educated at Cheltenham and Lincoln College, Oxford, and, after taking his degree in 1859, was called to the bar, but chose literature as a profession. The best known of his books are *Edmund Burke* (1867), *Critical Miscellanies* (1871 and 1877), *Voltaire* (1872), *On Compromise* (1874), *Rousseau* (1876), *Diderot and the Encyclopædists* (1878), *Richard Cobden* (1881). From 1867 till 1882 he edited the *Fortnightly Review;* and he has edited the 'English Men of Letters' series. He is an honorary LL.D. of Glasgow. Though possessing great literary faculty and power of phrase, Mr Morley's desire has not been merely to write a readable book or to transmit knowledge, but always to make character stronger and deeper. He seems oppressed by the triviality of life; he feels that only the best is worth an effort, but that this is worth all effort, while indifference and mediocrity of aspiration are the greatest curses of mankind. In politics he has been throughout life a pronounced Radical, and in religious questions he has long stood far apart from the great majority of his countrymen.

He unsuccessfully contested Blackburn in 1865, and Westminster in 1880. From 1880 to 1883, when he was elected for Newcastle-on-Tyne, Mr Morley was editor of the *Pall Mall Gazette*. His articles in favour of Home Rule written then, and followed up by action in the House of Commons and speeches in the country in 1885, did much to influence public opinion before Mr Gladstone's change of policy was known. In 1886 he became Irish Secretary till the dissolution which followed the rejection of the Home Rule Bill in that year. In 1890, during the difficulty as to the leadership of the Irish party, he directly supported Mr Gladstone. As a speaker Mr Morley has certainly succeeded in the country; he has few of the superficial gifts of an orator, but he never fails to convey to a public audience an irresistible impression of earnestness and sympathy, which has given him a personal hold on men's minds. Though not an advocate of state interference, he wishes politics to be regarded as a means for raising the oppressed, and elevating national character. His political opponents say that Mr Morley is a man of letters, more fitted to write history than to make it, but seized with a perverse desire to be a politician. Time will show whether to that earnest courage, which helped him to make a mark in literature, he adds the penetrating insight into the affairs of the moment and the quickness of decision which are also essential to the highest success in public life. See the *Review of Reviews* for December 1890.

Morley, SAMUEL, merchant and philanthropist, was born in Homerton, October 15, 1809. He entered his father's hosiery warehouse in Wood Street when sixteen, was methodical and punctual in his habits, and his influence was early felt in the business, in which he shared the chief responsibility along with his brother John from 1840 till 1854, when he became sole head of the concern. About 3000 persons were employed in its seven factories. He was returned to parliament for Nottingham, in the Liberal interest, in 1865; was unseated on petition; represented Bristol, 1868–85, and declined a peerage which was offered to him in the latter year. Like Lord Shaftesbury, Morley was identified with many religious and philanthropic movements. He also gave £6000 towards the erection of a Nonconformist memorial hall, and during 1864–70 contributed £14,000 towards the erection of Congregational chapels. He died September 5, 1886. See Life by Hodder (1887).

Mormaer. See EARL.

Mormons, or, as they call themselves, the Church of Jesus Christ of Latter-day Saints. The founder of this religious organisation was Joseph Smith, who was born at Sharon, Vermont, on 23d December 1805. He was the son of a farmer, and at the age of ten removed with his parents from the state of Vermont to Palmyra, in the state of New York, and four years later to the neighbouring town of Manchester. It was here, according to his claim, that he received in 1820 his first revelation—his divine call as a prophet of the Most High, with no less authority and power than were wielded by the ancient seers and prophets of biblical fame. Prior to this he had belonged to no religious body, though of a spiritual turn of mind, with a leaning toward Methodism. He declared that no less a visitation than that of the Father and the Son, of two persons of the Trinity, was vouchsafed to him. His second visitation from the unseen world was on the evening of 21st September 1823. A glorious personage appeared at his bedside, and, announcing himself as a messenger from the presence of God, 'called me by name and said unto me . . . that God had a work for me to do, and that my name should be had for good and evil among all nations, kindreds, and tongues. . . . He said there

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was a book deposited, written upon golden plates, giving an account of the former inhabitants of this continent, and the source from whence they sprung. He also said that the fullness of the everlasting gospel was contained in it, as delivered by the Saviour to the ancient inhabitants. Also, that there were two stones in silver bows deposited with the plates, and the possession and use of these stones was what constituted seers in ancient or former times, and that God had prepared them for the purpose of translating the book. . . . While he was conversing with me about the plates, the vision was opened to my mind that I could see the place where the plates were deposited, and that so clearly and distinctly that I knew the place again when I visited it.' This visitation was supplemented by others, the same angel appearing to him thrice that night, and afterwards paying him several visits and instructing him at length in relation to his prophetic mission. The spot where the records lay concealed was described as being 'on the west side of a hill, not far from the top, about 4 miles from Palmyra, in the county of Ontario, and near the mail-road which leads thence to the little town of Manchester.' Thither the youth repaired the next day, and was shown the plates as he had been promised, but was not permitted to take them. Four years later, however, after due disciplinary probation, on the night of September 22, 1827, the angel of the Lord delivered the sacred records into his hands. They were engraved on plates nearly 8 inches long by 7 wide, a little thinner than ordinary tin, and bound together by three rings running through the whole. The volume was altogether about 6 inches in thickness, a part of which was sealed. The characters, letters, or hieroglyphics upon the unsealed part were small and beautifully engraved. They represented an unknown language, which Mormons have called the 'Reformed Egyptian.' Along with them were found the Urim and Thummim, described by the angel; by means of this instrument, which is said to have borne some resemblance to a pair of spectacles, the Lord enabled the young man to translate the ancient records into English. He read off by the aid of the Urim and Thummim to his associate and scribe, Oliver Cowdery, or other clerks, who wrote down the words exactly as he gave them. The first edition of the *Book of Mormon* (5000 copies) was published at Palmyra, New York, in 1830. It contained a prefatory testimonial, signed by Oliver Cowdery, David Whitmer, and Martin Harris, to the effect that an angel of God came down from heaven and showed them the plates from which Joseph Smith translated the *Book of Mormon;* and this was followed by the testimony of eight other witnesses, among them Joseph's father and two brothers, who affirmed that 'Joseph Smith, junior,' had shown them the golden plates containing the engravings. These were the only persons who were permitted to see them. They were returned to the angel after the work of translation was done. Only the unsealed portion of the plates was translated, the sealed remainder being reserved, with a promise of translation at a future time.

These records contain the primitive history of America from its settlement by a colony that came from the Tower of Babel, at the time of the confusion of tongues, to the beginning of the 5th century of the Christian era. These primitive colonists of North America were called Jaredites. They were a race highly favoured of heaven, but degenerated and became wicked and corrupt, the sun of their civilisation finally setting in a sea of blood and civil strife, in which millions of souls were slaughtered. But a new race came directly from Jerusalem about 600 B.C., and in time peopled both North and South America. The founders of the new colony were Lehi and his wife, his four sons Laman, Lemuel, Sam, and Nephi, with their wives; Zoram, a servant, and his wife; in all sixteen persons. They landed on what is now the coast of Chili, in South America. After Lehi's death quarrels broke out among the brothers. The Lord had appointed Nephi to be the ruler of the new race of colonists, but his jealous elder brothers rebelled, and were cursed by the Almighty for their iniquities, and condemned to have dark skins, this punishment to continue in their posterity. They became 'an idle people, full of mischief and subtlety, which did seek in the wilderness for beasts of prey.' They were known as Lamanites, and, according to the *Book of Mormon*, were the ancestors of the American Indians. The Nephites became highly civilised and prosperous, were fair and beautiful to look upon, and were greatly blessed of the Lord, though often ungrateful for his goodness. Both Nephites and Lamanites increased and multiplied, but were almost continually at war with each other. About the time of the Crucifixion, awful earthquakes, darkness, and destruction announced that event. Shortly afterwards Christ himself appeared out of heaven to the more righteous Nephites. He showed them his wounded side and the print of the nails in his hands and feet, instructed them in the truths of his gospel, healed the sick, blessed children, administered the sacrament, chose twelve apostles, and gave them power to found his church with the same orders of priesthood, the same ordinances, gifts, powers, and blessings as in the Old World. After a prolonged season of peace, the result of the spread of the work of Christ, which at one time was received by both Nephites and Lamanites, hostilities between the two races were resumed, gradually the purity of their faith declined, and finally, about the year 385 A.D., a decisive conflict, similar to that which had destroyed the Jaredites in the same locality, took place near the hill Cumorah, where the Nephites were almost totally annihilated. The Lamanites remained a dark and benighted race, to people the waste of ruin, and faintly perpetuate in their customs and traditions the story of the illustrious past. Shortly before the battle of Cumorah, a Nephite prophet named Mormon had been commissioned of God to write an abridgment of the history of his people, from the records kept by their various prophets and rulers, to be hidden in the earth till God should see fit to bring it forth and 'unite it with the Bible for the accomplishment of his purposes in the last days.' This abridgment, written upon golden plates, was concealed in the hill by Moroni, a son of Mormon, and one of the survivors of the battle of Cumorah. He it was who appeared as an angel to Joseph Smith and told him where the plates were deposited. Such is the famous *Book of Mormon*, believed by the Latter-day Saints (hence called Mormons and Mormonites) to be of equal authority with the Jewish and Christian scriptures, and to form an indispensable supplement to them, containing God's revelations to the New, as the others to the Old World.

The work being published, attention was speedily drawn to it. The opponents of the Saints alleged that it was made up from a romance written by a quondam clergyman named Solomon Spaulding (1761–1816). This the Mormons emphatically deny, and the discovery of the original MS. of that romance by President Fairchild of Oberlin College, 1884, corroborates their denial. Undeterred by ridicule and hostility, the Mormon prophet and his associates declared that the

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millennium was nigh at hand, that the Indians would soon be converted, and that the new Jerusalem, the Zion of the last days, where the Saints would finally gather to prepare for the coming of the Lord in his glory, was to be built in the heart of the American continent. America, they claimed, was the land of Joseph, bestowed upon him and his posterity for ever by the blessing of the patriarch Jacob, as recorded in Genesis and Deuteronomy. The prophet's house was frequently beset by mobs and 'evil-designing persons;' several times he was shot at and very narrowly escaped; but his courage and zeal continued to bring him disciples, and on April 6, 1830, the Church of Jesus Christ of Latter-day Saints was legally organised, with six members, at the house of Peter Whitmer, in Fayette, Seneca county, New York. Several months prior to this the Aaronic priesthood, restored by an angel who said that he was John the Baptist, was conferred upon Joseph Smith and Oliver Cowdery, and later they were ordained to the Melchizedek priesthood by the apostles Peter, James, and John. The new religion spread rapidly and gained many converts. Branches of the church were established in New York, Pennsylvania, Ohio, the British provinces, and the New England states. The prophet was fiercely attacked by the leaders and preachers of the other religious denominations, but held his ground firmly. Though but poorly educated, he was a formidable opponent in the polemical field. In January 1831, in compliance with revelation, the church removed westward and established its headquarters at Kirtland, Ohio, where it began to thrive amazingly. In the summer of 1831 a colony from Kirtland migrated to Missouri, where they purchased lands in Jackson county, which had been revealed to the Mormon prophet as the chosen site for the city of Zion. At a place called Independence his colonists concentrated themselves, established a printing-press, started a monthly periodical, the *Evening and Morning Star*, and continued to preach zealously and make proselytes to their faith. Their success and rapid increase here, as elsewhere, raised up enemies. Secret societies were formed to expel them from Missouri, their houses were attacked by mobs, their periodicals were stopped, their printing-press confiscated, their bishop tarred and feathered, and numberless other outrages committed against them. Finally, in the autumn of 1833, the entire community, numbering about 1500 souls, were driven from their homes, whipped, plundered, many of them killed, and the survivors expelled from Jackson and scattered through the adjoining counties. The main body of the refugees found a resting-place and kindly welcome in Clay county.

Meanwhile the Saints in Ohio had suffered some persecution. On the night of March 5, 1832, at Hiram, Portage county, a mob broke into a house where the prophet was sleeping, tore him from the arms of his wife, hurried him to an adjoining meadow, tarred and feathered him, and forced aqua fortis into his mouth. Sidney Rigdon, his associate, was similarly handled and rendered temporarily insane. Later on Smith was assailed by divers vexatious prosecutions, but each time came off victorious. He set up a mill, a store, and a bank in Kirtland, and continued his propagandist labours with great success. In June 1833 the building of a temple in Kirtland was commenced. Shortly afterwards a printing-press was established in the city, and Oliver Cowdery recommenced the publication of the *Evening and Morning Star*. In July 1834 the Mormon prophet visited for the third time his people in Missouri. He was accompanied by 204 persons, mostly young men. This was the 'Zion's Camp' expedition, the object of which was to relieve the wants of their afflicted brethren who had been driven from their homes in Jackson county, and, if possible, effect a reconciliation between them and their former neighbours. They purchased lands in Caldwell county, Missouri, where they settled and founded the city of Far West. At Kirtland on February 14, 1835, the Twelve Apostles of the church were chosen, and soon after the council of the Seventies, their co-labourers in the ministry, was called into existence, and sent forth with the apostles to begin the work of 'pruning the Lord's vineyard for the last time.'

In June 1837 Heber C. Kimball, Orson Hyde, Willard Richards, Joseph Fielding, and others left Kirtland for England, and landed at Liverpool, July 20. Three days later they began preaching in Preston, and met with such remarkable success that within the next eight months, at the expiration of which time Kimball and Hyde returned to America, they had converted and baptised about 2000 people. The British mission was the first foreign mission of the Mormon Church.

On account of apostasy and persecution Kirtland was now pretty much abandoned by the Saints, the main body of them with the prophet and other leading elders migrating to the new 'Stake of Zion' in Missouri. They settled in Caldwell, Daviess, Clinton, Carroll, and Ray counties, where they bought land and improved it. At Far West, Caldwell county, the corner-stone of a temple was laid, a printing-office was established, and a monthly paper, called *The Elder's Journal*, published. But an election riot in August 1838, in Gallatin, Daviess county, where attempts were made to prevent the Mormons from voting, and some of them were obliged to defend themselves against assailants, was made the pretext for further acts of violence and rapine, from which the Saints in the outlying settlements were sufferers. The mob even burned the houses and laid waste the property of some of their own sympathisers in order to make it appear the work of the Mormons, who were falsely accused of deeds similar to those of which they were the victims. The result was a general uprising. The militia of the state was called out to suppress the riots, but took side with the mob against the unpopular Mormons. Governor Boggs issued an order for them to be 'exterminated or driven from the state,' and commanded Major-general Clark with several thousand troops to proceed at once to Far West and execute the decree. To this overwhelming force the inhabitants of the city peaceably surrendered, though compelled to look on and see their city sacked and pillaged, their wives and daughters outraged and insulted, and a number of their brethren killed by the mob and the soldiery. The Mormon leader and about seventy others were retained as prisoners, and the body of their followers, on penalty of death, ordered to leave the state forthwith. From twelve to fifteen thousand people in the autumn and winter of 1838 crossed the Mississippi, and were kindly received in the neighbouring state of Illinois. Joseph Smith and the other prisoners were tried by court-martial (November 1) and condemned to be shot, but escaped execution.

The Mormon prophet next rallied his people on the banks of the Mississippi, principally at or near Commerce, Hancock county, Illinois, where they again purchased homes and founded the city of Nauvoo (q.v.). This region though naturally fertile was then a mere wilderness, but Mormon thrift and industry soon made it 'blossom as the rose.' The legislature of Illinois granted a liberal charter to Nauvoo, and a body of Mormon militia was formed under the name of the 'Nauvoo Legion,' with the prophet himself as its commander. Meantime the Twelve Apostles, with Brigham Young at

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their head, had preached a wonderfully successful mission in the British Isles, whence they sent many hundreds of converts across the Atlantic. Within five years the Mormons numbered in Illinois about 20,000 souls.

After a few years of comparative peace and prosperity the tempest of persecution again burst upon the Mormon community. Governor Ford ordered into service several hundred men, had Joseph Smith arrested with his brother Hyrum, and immured in Carthage gaol, Willard Richards and John Taylor accompanying them. In the afternoon of June 27, 1844, a mob of about 150 men with blackened faces broke into the gaol and shot the two brothers Smith dead, also severely wounding John Taylor. The assassins were never brought to justice. Mormonism was now thought to be doomed, but under the leadership of Brigham Young it survived the shock of its prophet's martyrdom: 'the blood of the martyrs' proved, as ever, to be 'the seed of the church.' But the anti-Mormons were determined on the removal of the entire community of Latter-day Saints from the state, and the Mormon leaders, seeing no alternative but to comply with this demand or experience a repetition of the murderous scenes of Missouri, finally resolved once more to abandon their homes, and seek a haven of peace and safety in or beyond the Rocky Mountains. Accordingly, on 1st February 1846 a thousand families left Nauvoo, crossing the Mississippi on the ice. At Council Bluffs, on the Missouri River, in the month of July 1846, Captain J. L. Allen of the United States army called on the Mormons to raise a battalion for service in the Mexican war. The exiles speedily raised the five hundred troops required, though it took nearly all their able-bodied men. The families left at Council Bluffs, unable in the absence of the battalion to proceed farther that season, crossed the Missouri and established 'Winter Quarters,' now Florence, Nebraska. Meanwhile the residue of the community left behind in Nauvoo, after a gallant defence of their city against the mob, which in violation of treaty came upon them in overwhelming numbers, were expelled from their homes and thrown shelterless upon the western shore of the Mississippi.

In the spring of 1847 Brigham Young at the head of a picked band of pioneers, 143 men, 3 women, and 2 children, started from Winter Quarters for the Rocky Mountains. They arrived in the valley of the Great Salt Lake, the site of their present beautiful city, on July 24, and began to plough the ground and put in crops the same day. Seven hundred more wagons arrived that autumn, and 1000 wagons in the autumn of 1848. In December 1847 Brigham Young was chosen president of the church—an office left vacant since the death of Joseph Smith—with Heber C. Kimball and Willard Richards as his counsellors in the First Presidency. In 1849 the provisional government of the state of Deseret was organised at Great Salt Lake City, a state constitution adopted, and a delegate sent to congress to ask for admission into the Union. The petition was refused, but in September 1850 congress created Utah a territory, and President Fillmore appointed Brigham Young governor, which office he held from 3d February 1851 until 11th April 1858, when he was succeeded in that office by Alfred Cumming. In 1857 the Mormons were falsely charged with being in a state of rebellion against the government, and President Buchanan sent a considerable military force to Utah. Young and his people fearing military excesses, and remembering the fate of Far West and Nauvoo, kept the army east of the Wasatch Mountains until the next spring, when arrangements were made for the peaceable entry of the troops, the Mormons having abandoned their city and surrounding parts and removed south, with the avowed determination of burning every building and reducing Utah to its former condition of barrenness if vindictively pursued. They were not, however, molested. The troops passed quietly through the city and encamped in Cedar Valley, about 40 miles south-west, and the people returned to their homes. Since then their cities and settlements have extended from Idaho through Utah into Wyoming, Colorado, Nevada, Arizona, New and Old Mexico. The Mormons also have a settlement in British America. In Utah they have three temples in St George, Logan, and Manti, and a fourth, an imposing edifice, in Salt Lake City.

The Mormons have sent many missionaries to the British Isles and nearly every other European country, also to Australasia, Africa, Palestine, the East and West Indies, China, Burma, Siam, South America, and the Society, Sandwich, and Samoan Islands, and from most of these places have gathered numerous converts. In 1849 the Perpetual Emigration Fund was established, to assist poor Saints in distant lands to emigrate to Utah. Annual and semi-annual general conferences of the whole church are held, generally at Salt Lake City, and quarterly conferences in the various 'stakes,' and usually in the various missionary fields.

Organisation.—The ecclesiastical authorities of the Church of Jesus Christ of Latter-day Saints comprise two priesthoods—the Melchizedek or High Priesthood, and the Aaronic or Levitical, which is the lesser priesthood. The latter ministers in temporal things, the former in spiritual things, though having general authority and supervision over the whole. Apostles, seventies, high-priests, patriarchs, and elders belong to the Melchizedek priesthood, bishops, priests, teachers, and deacons to the Aaronic. The highest authority in the church is the First Presidency, consisting of the president of the whole church and two counsellors. There have been four of these presidents—viz. Joseph Smith (martyred June 27, 1844), Brigham Young (born June 1, 1801, died August 29, 1877), John Taylor (born November 1, 1808, died in exile July 23, 1887), and Wilford Woodruff (born March 1, 1807). The death of the president dissolves the First Presidency, the authority of which then devolves upon the next highest council, the Twelve Apostles, who nominate his successor. Since the death of Joseph Smith, selection has invariably been made of the president of the Twelve Apostles to preside over the church. The third body is the Seventies, of whom there are one hundred councils (commonly termed quorums), each of seventy members, each council having seven presidents, included in the seventy. The seven presidents of the first council of seventies preside over all the councils of seventies. The duties of the above three bodies are general rather than local. The cities and settlements of the Saints are organised into stakes, each usually covering one county. Each stake has a president, assisted by two counsellors, also a high council of twelve members (who are high-priests), presided over by the president of the stake and his two counsellors. Each stake is divided into several wards, presided over by a bishop and his two counsellors. The high-priests of any stake form a council indefinite in number. A council of elders consists of 96 members; of priests, 48; of teachers, 24; of deacons, 12. An apostle is a special witness to all the world. The Twelve Apostles are a travelling presiding high council, to build up the church and regulate the affairs of the same in all nations, as well as at home, under the direction of the First Presidency, when there is a First Presidency. A seventy's duty is to travel and minister under

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the direction of the apostles. The special office of a patriarch is to administer patriarchal blessings. Apostles, patriarchs, high-priests, seventies, bishops (if high-priests), and elders can preach, baptise (invariably by immersion), lay on hands for the gift of the Holy Ghost, and minister in various other ordinances of the church. Neither priests, teachers, nor deacons can lay on hands for the gift of the Holy Ghost, but a priest may preach and baptise. Neither a teacher nor a deacon can baptise or administer the sacrament, which all the other officers named may do. The special duty of a teacher is to visit and teach the members in order to promote morality and faithfulness. The special duty of a deacon is to attend to minor temporalities, and to assist the teacher in his duties.

Doctrine.—The articles of faith of the Church of Jesus Christ of Latter-day Saints: 'We believe in God, the Eternal Father, and in his Son, Jesus Christ, and in the Holy Ghost. We believe that men will be punished for their own sins, and not for Adam's transgression. We believe that through the atonement of Christ all mankind may be saved, by obedience to the laws and ordinances of the gospel. We believe that these ordinances are (1) faith in the Lord Jesus Christ; (2) repentance; (3) baptism by immersion for remission of sins; (4) laying on of hands for the gift of the Holy Ghost. We believe that a man must be called of God by "prophecy and by the laying on of hands," by those who are in authority, to preach the gospel and administer in the ordinances thereof. We believe in the same organisation that existed in the primitive church—viz. apostles, prophets, pastors, teachers, evangelists, &c. We believe in the gifts of tongues, prophecy, revelation, visions, healings, interpretation of tongues, &c. We believe the Bible to be the word of God, as far as it is translated correctly; we also believe the *Book of Mormon* to be the word of God. We believe all that God has revealed, all that he does now reveal, and we believe that he will yet reveal many great and important things pertaining to the kingdom of God. We believe in the literal gathering of Israel and in the restoration of the ten tribes; that Zion will be built upon this [American] continent; that Christ will reign personally upon the earth, and that the earth will be renewed and will reach its paradisaic glory. We claim the privilege of worshipping Almighty God according to the dictates of our own conscience, and allow all men the same privilege, let them worship how, where, or what they may. We believe in being subject to kings, presidents, rulers, and magistrates, in obeying, honouring, and sustaining the law. We believe in being honest, true, chaste, benevolent, virtuous, and in doing good to all men; indeed, we follow the admonition of Paul—"We believe all things, we hope all things," we have endured many things, and hope to be able to endure all things. If there is any thing virtuous, lovely, or of good report or praiseworthy, we seek after these things' (Joseph Smith).

They also believed in the patriarchal order of marriage, as practised by Abraham, Jacob, and other ancient worthies; they held that it is right and proper, under certain restrictions, for a man to have more than one wife, providing he is chaste and upright in his conduct and otherwise worthy of the privilege. Their marriages are 'for time and all eternity,' as they believe in the perpetuation of the family relationships hereafter. Joseph Smith received the 'revelation on the eternity of the marriage covenant, including plurality of wives,' July 12, 1843, but it was not published to the world until August 29, 1852. A woman, among the Mormons, who does not marry and bear children is regarded as not having fulfilled all the law of her own being. A defence of the system has been set up on moral grounds, as well as on the ground of revelation. They declare that prior to the advent of the Pacific railroads (which, by the way, the Mormons helped to construct), and the consequent influx of 'Gentile' civilisation, their community was free from the horrible vices and degrading social evils that prevail elsewhere; fornication and adultery were unknown; there were no prostitutes, no vile seducers, no illegitimate children. Their wives are asserted to be happy, virtuous, and healthy, and their social and domestic purity and felicity challenge the highest commendation.

Congress has legislated repeatedly against the polygamic feature of their faith. An anti-polygamy law, passed in 1862, remained practically a dead letter, only one conviction being secured in twenty years, and that in a test case, upon evidence furnished by the defendant. For years after the passing of the act referred to congress permitted a Mormon delegate, who had several wives, to hold his seat in the House of Representatives; but in 1882 he was denied that right, and a monogamic Mormon was sent in his stead to congress. In March 1882 an act supplementing the law of 1862 was passed, making it an offence punishable by fine and imprisonment for a man to marry more than one wife or to cohabit with more than one woman. This act, popularly known as the Edmunds Law, was applied specially against the Mormons, and was rigorously enforced. In July 1887 a constitutional convention, composed entirely of monogamic Mormons, who were vastly in the majority in the church, met at Salt Lake City, and, adopting a constitution for the 'state of Utah,' containing a clause prohibiting and punishing polygamy and unlawful cohabitation, applied once more—the fifth time in the history of the territory—for admission to the Union as a state. Like all the previous applications, however, this was refused. Finally, in September 1890 President Woodruff issued a proclamation declaring that the church no longer teaches the doctrine of polygamy or plural marriages, and accepts the United States law prohibiting such marriages; and this declaration was afterwards confirmed in conference.

[The foregoing article is written from the Mormon point of view by the historiographer of the church. For the massacre of an emigrant band of 'Gentiles' at Mountain Meadow in 1877, see DANITES. The grounds upon which the Mormons were refused admittance to the full rights of American citizens were stated in November 1889 to be these: 'That the Mormon Church is a treasonable organisation hostile to the government of the United States, and that the oaths administered to its members in the Endowment House, on the occasion of their passing through the initiation mysteries of "endowment," bind them to render implicit obedience not only in things spiritual, but also in things temporal and political, to the priests and officers of the church, and to avenge the death of the prophets Joseph and Hyrum Smith—this under penalty of death for disobedience. The reasons for refusing Utah admission to the status of a state of the Union will fall away when the Mormons give full and satisfactory proofs that they have really abandoned polygamy, and when the constitution of the United States shall have been so amended as to prohibit polygamy in all parts of the Union.' These facts and reasons the Mormons deny. Yet from the proclamation referred to in the last paragraph above, it is evident that they determined to fulfil the requirements of the law, and to obtain their territory's admission as a state. The Mormon Church is believed to number about 250,000 members, of whom 110,000 are in Utah. In the year 1890 there were 3000 Mormons in New Zealand and

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3142 in Great Britain. A body calling themselves the Reorganised Church of Jesus Christ of Latter-day Saints, and presided over by Joseph Smith, son of the founder of the Mormon Church, seceded in 1860. They now number 25,000, and their headquarters are in the states of Iowa and Illinois. They claim to be the orthodox Mormons and repudiate their co-religionists of Utah, on the ground that Brigham Young was a usurper, and that plural marriage is a device of Young and his associates devised after Smith's death and suppressed for a time for politic reasons.—ED.]

The *Book of Mormon* has been translated into several foreign languages, as also the *Doctrine and Covenants*, the *Hymn-book*, and the *Voice of Warning*. Besides these, the principal Mormon publications are *Life of Joseph Smith*, *Key to Theology*, *Spencer's Letters*, *Compendium of the Doctrines of the Gospel*, *Life of Heber C. Kimball*, *Autobiography of Parley P. Pratt*, *Story of the Book of Mormon*, *Catechism for Children*, *Snow's Poems*, *Harp of Zion*, *Correspondence of Palestine Tourists*, and many minor works. The Mormon periodicals at present published embrace twenty in the United States, one in England (Liverpool), two in Scandinavia, and one in Switzerland. The university of Deseret in the territory of Utah supports classical and normal schools; it takes rank, however, as a literature, J. H. Kennedy's *Early Days of Mormonism* (1888) and H. H. Bancroft's *History of Utah* (1889), which contains a full bibliography, may be consulted.

Morning Glory. See CONVOLVULUS.

Morny, CHARLES AUGUSTE LOUIS JOSEPH, DUC DE, a French statesman, believed to have been the son of Queen Hortense and of the Comte de Flahault, and consequently half-brother of Louis Napoleon, and consequently half-brother of Louis 1811, and He was born in Paris, 23d October entered and adopted by the Comte de Morny. He distinguished the army in 1832, and served with some military distinction in Algeria; but he soon abandoned a military life, and in 1838 made his début in the sugar industry as a manufacturer of beet-root sugar. Ever after that time he was mixed up in all sorts of commercial and financial speculations—railway companies, canal companies, French and foreign mining companies, credit societies, and various industrial enterprises. Chosen a deputy in 1842, he quickly attained a prominent position on account of his aptitude for dealing with financial questions. After the revolution of 1848 he became attached to the cause of his half-brother, and was the leader of the subtle and treasonable policy of the Elysée. He took a prominent part in the *coup d'état*, and became minister of the Interior. In 1854–56, and again in 1857–65, he was president of the *Corps Législatif*, which he succeeded in reducing to subservience; and was ambassador to Russia during 1856–57, where he married the rich and handsome Princess Trubetskoi. He died 10th March 1865. The character of the 'Duc de Mora' in Daudet's *Nabab* is based on this clever and unscrupulous politician.

Moroni, GIOVANNI BATTISTA, painter, was born at Albino, near Bergamo, about 1510, and was a pupil of Il Moretto of Brescia (1498–1555), whose real name was Alessandro Bonvicino; both these men excelled as portrait-painters. Indeed, of the North Italians, Moroni ranks next to Titian, who greatly admired his portraits. The attitudes in Moroni's pictures are easy and natural, the draperies well managed, and the predominant tone of colour is silvery. An excellent example of his style is the 'Tailor' in the National Gallery, London, where there are also four other portrait-pieces from his brush. Moroni likewise painted sacred subjects of the usual types, now in the Brera at Milan, at Bergamo, at Verona, and other places in North Italy. He died 5th February 1578.

Morocco, or MAROCCO, known to the natives as *Maghreb-el-Aksa*, 'the farthest west,' is an empire or sultanate which, though at one time comprising a portion of Algeria in one direction, and exercising in the other a modified jurisdiction as far as Timbuktu, is now confined to that part of north-west Africa bounded on the E. (at the Wad Kiss) by Algeria, and on the S. by Cape Nun and the Wad Draa, though both here and on the Sahara side of the Atlas the limits of the empire are rather indeterminate. Very little of the country has been even roughly surveyed; but, according to the vague knowledge possessed, it contains about 314,000 sq. m., of which the 'Tell' or fertile region west of the Atlas contains 78,000, the Steppes or flat sterile upland pastures, 27,000, and the Desert or Sahara, 209,000 sq. m. Politically, Morocco comprises at present the old kingdoms of Fez and Morocco and the territories of Tafilet (Tafilalet) and Sus; but the two latter are almost independent, recognising the sultan only as the Prince of True Believers, an office which he holds as the most powerful of the Shereefs or descendants of Mohammed. These four principal governments are divided into seventeen primary provinces or 'amalats,' each presided over by a Kaïd or 'Bashaw,' as the Europeans call him, who again has under him various minor officials directing the affairs of the smaller districts, until the headman of the village is reached. Many of the Arab and most of the mountain tribes are practically independent, never being troubled by the Shereefian officers, and paying taxes only when an army enters their country. Over this region, living in a few moderately-sized towns, and numerous little stationary villages of stone or clay (*dshars*) or in the tent hamlets (*douars*) of wandering tribes, is scattered a population variously estimated from 2,500,000 to 13,000,000—the actual number being perhaps between three and four millions. But there is no census, and the country-people, in order to avoid the extortion of the troops and the 'mouna,' or gift of provisions to favoured travellers, prefer to live in retired spots at a distance from the ordinary routes through the country. Morocco is, as a rule, mountainous, the Atlas (q.v.) traversing it in several chains from south-west to north-east, and by various spurs both to the coast country and to the desert. There are, however, numerous level plains, some of which are of great extent, and very rich, the soil being in many places a deep, black loam, evidently the bed of an ancient lake or of a primeval forest. There are also numerous more or less level plateaus similar to those of Algeria. But with the exception of parts of the Atlas, the forest of Mamora, the date and argan groves of the south, and a few straggling copses around the burial-places of saints, Morocco has, in the course of the last thousand years, been almost denuded of timber, the palmetto (*Chamærops humilis*) scrub being about the most common representative of woodland. Consequently the country looks bald, rolling hills and monotonous plains, green in spring, brown during summer and autumn, being the most characteristic features of the north, though some of the glens and mountain-regions are extremely picturesque. Farther south, and on the other side of the Atlas, where long droughts, followed by famines, are common calamities, and the rainfall is at the best of times scanty and uncertain, sandy wastes are the prevailing characteristic; but in western Morocco, though the soil is sometimes thin and out of the river-valleys stony, actual desert is rare, and, except where the sand has been drifted inland by the winds, not unfitted for pasturage.

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The central range of the Atlas forms the watershed separating the streams which flow into the Atlantic and Mediterranean from those which run southward toward the desert, where they are often lost in marshy 'sinks' or *sebkhas*. And of the streams falling into the Atlantic and Mediterranean, many are in the hot season or after long droughts little better than a succession of pools connected by threads of water, though rolling in brown floods from bank to bank during the wet season, when they are dangerous to cross. None of them are navigable for any distance from their mouths, which are always impeded by bars and shoals. Yet before the 14th century vessels of considerable tonnage went 40 miles up the Sus to Tarudant, and stern-wheel steamers could even yet easily navigate the Sebu to within a few hours of Fez. But there are not even barges on them.

The *climate* of Morocco varies much, though the western slope, being tempered by the sea-breezes and protected from the hot desert-winds by the Atlas, is temperate, the thermometer seldom falling below 40° or rising above 90°. But in summer the interior valleys are very hot, and in winter snow often falls in Fez and Mequinez, where ice an inch thick is by no means uncommon. In Tangier there has been a slight snow-shower about twice in forty years, and in Mazagan even less frequently. Farther south extremes of heat and drought are more common, though as a rule the climate is equable, and, unless in swampy places during summer, extremely healthy. In the Sus country and the region of Tafilet rain is scarce and in places almost unknown. But farther north, and on the Atlantic and Mediterranean slopes, it falls with tolerable regularity every year between October and April, the amount being at times so great that the low lands are flooded, the rivers impassable, and the mountain-sides, unprotected by wood, furrowed by torrents, sweeping the soil and debris before them into the valleys below. On the upper reaches of the Atlas there is all summer a June-like atmosphere; but in winter they are capped deep with snow.

Morocco is thus fitted for growing any crops of the temperate and tropical zones, and under a better government would become, as Barbary was in Roman times, the granary of Europe. Wheat and barley are grown largely, and were they allowed to be freely exported would be produced in immense quantities. Maize forms the chief export of Mazagan. Various gums, oranges, figs, almonds, lemons, and dates are among the other vegetable products. Cotton and hemp are grown for home consumption. Tobacco cultivation is prohibited and its use forbidden by the sultan, though both it and 'keef' (Indian hemp) are used. Most European fruits grow well, and among other products sugar has been raised. Cattle (under treaty arrangement with Gibraltar) are exported; but no animals can be sent out of the country without an imperial permit. The exports (maize, beans, chick-peas, olive-oil, wool, almonds, dates, fowls, eggs, hides, bones, esparto, cattle to Gibraltar, &c.) amounted to £1,286,723 in 1887, and the imports (cotton goods, cloth, tea, coffee, sugar, candles, hardware, &c.) to £1,258,354, of which £630,245 were from Great Britain. The interior of the country is so little known, and the Atlas so entirely unexplored, except hastily in isolated places, that little can be said with certainty regarding its mineral wealth. But enough has been ascertained to enable us to assert that gold (placer and in quartz), copper, tin, argentiferous galena, nickel, antimony, iron, and manganese abound. Coal and petroleum have been indicated. Rich silver lodes exist at Gondofi near the head-waters of the Sus, and rock-salt is mined near Fez. But these mineral deposits are scarcely touched, and no European is allowed even to visit the mines.

The *flora* of Morocco is essentially European, so far as the western side of the Atlas is concerned, that of the Atlas generally being a southern extension of the temperate flora of the adjoining continent, with little or no admixture of southern types.

The *fauna* partakes of a similar character, the Barbary fallow-deer, wild boar, Barbary monkey (found also in Gibraltar), a species of porcupine, and wild cat being the most characteristic mammals; but the lion, once common, is now very rare in the inhabited parts of the country. The birds and fishes are those of southern Europe; of the forty species of reptiles and amphibia known, twenty-two also belong to Spain; and only eight of the Moroccan species, according to Böttger, inhabit the Ethiopian region—facts all pointing to a time when the Strait of Gibraltar did not divide Europe from Africa. Ostriches are seen only in the extreme south. Locusts often devastate the country. The Barbary horses have sadly deteriorated; while in agriculture, oxen, donkeys, camels, and even women yoked with them, are commonly employed to drag the rude one-stilted plough and the harrow, which consists of a bunch of thorns.

The *inhabitants* consist of six principal groups. The (1) Berbers (*Braber*) or Kabyles, of whom the Amazigh, Shelluh, and Tuareg are only branches, are the aborigines. They inhabit for the most part the mountain regions, and are still only half subdued. (2) The Arabs are descendants of the invaders who came in the 7th century. (3) The Jews were very early settlers, semi-independent colonies still subsisting in the Atlas and the Sus country, though most of them in the towns are refugees driven out of Spain and Portugal. (4) A few thousands of Europeans, chiefly Spaniards, are almost entirely confined to the coast towns. (5) The 'Moors,' a term vaguely applied to all the Mohammedan inhabitants, are really Arabs with a large admixture of Spanish and other European bloods, and the name ought properly to be restricted to the inhabitants of the cities. (6) The Negroes, of whom there are large numbers, were brought from the Soudan as slaves. Most of the latter are still in this condition, though the descendants of some of them now occupy high places in the army and the government. The Jews, though sorely oppressed when not under the protection of some 'Christian' power, prosper amazingly, and are allowed a certain autonomy in their own affairs, but are confined in the cities to a 'mellah' or Jews' quarter. In spite of many indignities, some have managed to hold offices of profit in the court.

The sultan, who is the last independent sovereign in the Barbary States (of which Tripoli is now directly under the sultan of Turkey), is one of the most perfect specimens of an absolute monarch existing. He is 'the state.' His so-called ministers are simply the favourites of the hour. Everything must pass through his hands. He receives the entire revenue, believed to be about £1,800,000 per annum, and spends as little or as much of it as he pleases. Every office is directly or indirectly purchased, small salaries or none are paid, the holders recouping themselves by plunder and oppression, tempered by the fact that at any moment they may be forced to disgorge to the sultan, or in default be left to rot in the loathsome Moroccan dungeons, or be beaten or tortured to death. All justice is bought and sold. Yet, owing to the religious fanaticism of the people, and the mutual jealousies of the European powers, whose representatives reside at Tangier, the political equilibrium is

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preserved, and the long-expected *débâcle* postponed. The only European nation which at present has any territory in Morocco is Spain, which maintains a fortress at Ceuta, and four convict settlements, and a fishing-station at Ifni. But independently of the sacred chiefs of Sus, the Grand Shereef of Wazan, as the nearest descendant of Mohammed, governs that city and is lord paramount or proprietor of a large territory in the neighbourhood; where he is, or was before he became a French subject and became addicted to Frankish ways, almost as powerful as the sultan himself.

Education is at a low ebb. Few of the people can read or write, a capacity to repeat by heart passages of the Koran or of Al Bekkhari's commentaries upon it, and the traditions being almost the sum of what is taught in the village schools. The so-called 'university' of Fez is nowadays merely a seminary attached to the chief mosque for the training of religious acolytes. Printing is still an unknown art, save amongst the Europeans of Tangier. There are no roads except bridle-paths, and no wheeled carriages in the interior except the sultan's state coaches. The chief industry besides the rude agriculture of the Berbers and Arabs, and the breeding of horses and mules, is the making of 'morocco' leather, harness, slippers, red 'Fez' caps, cloth for native apparel, the chiselling of brass trays, the making of rough pottery and of inlaid flint-lock muskets, and the weaving of carpets (principally in Rabat). The best mechanics and the jewellers are Jews.

The army has of late years been reorganised under European officers, a Scotsman (Kaïd Maclean) taking the chief part in this task, so that at present there is a force (the Askar) of about 10,000 men, drilled, armed, and clothed after an approach to the European fashion, the rest being mainly undisciplined native levies. Altogether, the sultan is believed to be able to mobilise upwards of 100,000 men, and double that number should the Faith be in danger. There is now no navy —imperial or mercantile—a single steam-transport representing the once-dreaded 'Sallee rovers.'

Morocco is connected with Spain by telegraph, and the telephone is in use in Tangier, Casablanca, and other coast towns. The posts also are confined to the Europeans. Morocco has three capitals or imperial residences, at one of which the sultan and his army reside at uncertain intervals and for indeterminate periods. These are Fez (q.v.), Makinas or Mequinez (q.v.), and Marakesch, better known as the City of Morocco (q.v.). Beside these the principal coast towns are Tangier (20,000 to 25,000 people); Tetuan (25,000), a little way up the Martil River; Larache (El-Arish), with 10,000 people (1800 Jews and 200 Europeans); Rabat and Sallee, on opposite sides of the Bu-Ragreb River (21,000); Casablanca, or Dar-al-Baida (8000); Mazagan (5000); Saffi (8000); and Mogador (q.v.). But all of them are decaying, most of them in partial ruins, and without any exception filthy, undrained, and insanitary to the last degree. When not mere collections of flat-roofed or thatched huts, of sun-dried bricks, around a *kasbah* or walled fortress, they are congeries of narrow intricate lanes, often covered over with vines or reeds to keep out the sun. These lanes are lined with shops which look like large packing-boxes, with the lids raised as a penthouse and padlocked at night, or else with whitewashed windowless walls, over which here and there rise the square towers of a mosque. But within these is often a pleasant courtyard shaded by oranges and palms and cooled by a fountain, into which open gaily Arabesque-painted rooms, furnished with the rich carpets that constitute the principal furniture of a strictly Moorish house. The sole accommodation for travellers is caravanserais, with a yard for beasts and unfurnished rooms for their owners.

After being for more than four centuries a part of the Roman empire, and in the latter period of its sway veneered with a corrupt Christianity, 'Mauritania Tingitana' fell (429 A.D.) into the hands of the Vandals, who held it until 533, when Belisarius having defeated them it became subject once more to the Eastern Empire. But in the year 680 the Arab invasion began, and with little intermission the Arabs have ever since been possessors of the country, and the entire population are now the most fanatical adherents of Mohammedanism. At first, with Spain, part of the califate of Bagdad, it became divided into several independent nomarchies, and during this period the country enjoyed a prosperity to which it has ever since been a stranger. After seeing the successive dynasties of the Edrisite (789 A.D.), Mahhditi, Zeiridi, Almoravidi, Almohadi, Beni Marini, Uatasi, Shereefi-El-hhoseini, and Shereefi El-Fileli (or Alides), and almost unbroken civil and foreign wars and revolutions, Muley (Mulái = 'My Lord') Ismaïl (1692–1727) united the entire country under his sway, and as one empire it has, with occasional rebellions, continued ever since. Morocco though now more contracted than formerly, has at present, with the exception of the Spanish 'presidios,' no foreign strongholds on its coast, as there were up to the year 1769, when the Portuguese evacuated Mazagan; and since the unsuccessful war with Spain in 1859–60 the country has not been disturbed by foreign hostilities. But it is still very backward. A passive resistance is offered to every improvement, and, though Christian slavery and piracy by government vessels have been abolished since 1817–22, and foreign traders have nominally had access to all parts of the empire, the interior is not much different from what it was a thousand years ago, and many cities and districts are still dangerous or impossible to visit. The slave-trade is as brisk as ever, negroes being openly hawked about the streets of the ports, and systematically offered for sale in the markets of the larger towns of the interior. The sultan's chief complaint against the European representatives is that some of them sell 'protections' wholesale to his subjects, and that thus whole villages are passing from under his sway; while they justly insist that every obstacle, short of absolute abrogation, is offered to the carrying out of the treaty obligations, and that owing to the long distance of the court from Tangier and the almost continual absence of the sultan during his punitory and tax-collecting expeditions it is hard to transact any business with him.

The city of MOROCCO (Arab. *Marakesch*, by which name it is usually known among European residents), the southern capital of the empire of the same name, is situated in 31° 37′ 28″ N. lat. and 7° 36′ 30″ W. long., between 4 and 5 miles from the left bank of the Tensift, at the northern end of an extensive and fertile plain dotted with date-palms, 1447 feet above the sea, about three and a half days' journey from Mogador and Mazagan, and two and a half from Saffi. It is surrounded by a lime and earth ('tabia') wall, once strong, but now dilapidated, more than five miles in circumference, between 20 and 30 feet high, flanked at regular intervals by square towers, and pierced by seven gates, some of which are said to have been brought piece by piece from Spain. The town is squalid and ill-built, though it bears the marks of former grandeur, the mean, flat-roofed, windowless houses on either side of the narrow, irregular, unpaved, filthy streets, being mostly one-storied and half in decay. A large portion of the immense space within the walls is occupied by

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ill-kept gardens, open areas, and 'soks,' or market-places; the eight large cemeteries are outside the walls. In the bazaar and merchants' quarter—the 'Kaiseria,' a partially-covered area—a considerable local trade is carried on with the country-people, the mountaineers from the neighbouring Atlas, and with Sus, Tafilet, Mazagan, Saffi, and Mogador, though the commercial importance of Morocco is much less than that of Fez. Morocco possesses many mosques, one of which, the Kutubia, has a tower after the model of the Hassan in Rabat and the Giralda in Seville, 230 feet high. There are several tanning and leather-dyeing establishments of considerable extent, though of late years European goods have been gradually displacing native manufactures. The population varies according to the presence or absence of the sultan, his court, and army. In ordinary times it does not exceed 60,000, of whom from 7000 to 8000 are Jews, living in a 'mellah,' or Ghetto, under the most degrading physical, political and moral conditions. But no Europeans reside permanently in the city. On the south, outside the walls, stands the imperial palace, an irregular conglomeration of gardens and buildings covering about 180 acres. But of late the sultan has resided very little here, a year or more often elapsing without his setting foot in the place.

Morocco was founded in 1072 by the Emir Jusef ben Tachefyn, and reached the summit of its prosperity in the 13th century. In those days it is affirmed to have contained more than 700,000 inhabitants. But for several centuries, owing to civil wars, during which the rebellious Berbers more than once sacked it, the city, like all the interior towns of Morocco, has been rapidly retrograding. However, owing to its excellent situation in sight of the Atlas, from which cool streams are always flowing, its genial healthy climate, and its command of the trade routes across the mountains, Marakesch is safe to have a great future when Morocco knows other masters than the Moors.

See Chenier, *Recherches historiques sur les Maures* (1787); Godard, *Description et Histoire du Maroc* (1860); Renou, *Description géographique de l'Empire de Maroc* (1846); Tissot, *Rech. sur la Géog. comparée de la Mauretanie Tingitane* (1877); Hooker and Ball, *Tour in Morocco* (1878); Castellanos, *Descr. hist. de Marruecos* (1878); Lenz, *Timbuktu* (vol. i. 1884); De Kerdec-Chény, *Guide du Voyageur au Maroc* (1888); Erckmann, *Le Maroc Moderne* (1885); Thomson, *Travels in the Atlas and Southern Morocco* (1889); De Foucauld, *Reconnaissance au Maroc* (1888); Stutfield, *El Maghreb* (1886); Harris, *The Land of an African Sultan* (1889); De la Martinière, *Morocco* (1889); De Campou, *Un Empire qui croule* (1886); Houdas' translation of Abou'l-qâsem ben Ahmed Ezziâni, *Le Maroc de 1631 à 1812* (1886); and the works and papers noted in the bibliographies of Renou and De la Martinière, and in the notes to Brown's edition of *Pellow's Adventures* (1890), and to the Hakluyt Society's edition of *Leo Africanus*.
See also MOORS, BERBERS, BARBARY.

Moron, a town of Spain, on the Guadaira, 32 miles by a branch-line SE. of Seville. Its ruined castle was once almost impregnable. Pop. 14,879.

Morpeth, a market-town of Northumberland, on the winding Wansbeck, 16 miles N. of Newcastle. The parish church dates from the 14th century; the free grammar-school, founded by Edward VI. in 1552, has an endowment of nearly £500 a year, and in 1859 was rebuilt, after a chancery suit lasting 150 years. The town-hall (restored in 1870) was erected in 1714 by Sir John Vanbrugh, and the county-hall in 1818 at a cost of £80,000. Morpeth has flannel-factories, breweries, tanneries, iron-foundries, &c., with collieries and quarries in the neighbourhood. From 1553 till 1832 it returned two members to parliament, but now only one; the parliamentary borough was extended in 1868. Pop. (1851) 10,011; (1881) 33,402, of whom only 4556 were in the municipal borough.

Morpheus (Gr., 'moulder'), in classic mythology, the son of sleep and the god of dreams. He is so named because he shapes or moulds the dreams that visit the sleeper. He is first mentioned by Ovid, and is represented as an old man with wings, pouring somniferous vapour out of a horn.

Morphine, or MORPHIA, $C_{17}H_{19}NO_3H_2O$, was the first alkaloid isolated in a pure state (by Sertürner, an apothecary, in Hanover in 1816). The name morphia was given to it in allusion to its crystalline form (Gr. *morphē*, 'form'). It is the most important of the alkaloids existing in opium, of which it usually constitutes from $\frac{1}{8}$th to $\frac{1}{16}$th by weight, and in which it is combined with meconic, sulphuric, and probably other acids. It is obtained as white, silky, translucent crystals, with a bitter taste and alkaline reaction. Morphine is soluble in about 1000 parts of cold and in 400 of boiling water; boiling alcohol dissolves it freely; but it is insoluble in pure ether and chloroform. Morphine is not so easily detected in cases of poisoning by opium as Meconic Acid (q.v.). The following are some of the ordinary tests for it: concentrated nitric acid added to morphine or any of its salts gives an orange colour; when it is mixed with iodic acid iodine is liberated; in solution it gives a blue colour with persalts of iron.

Morphine is the only opium alkaloid which is soluble in lime-water, and this property affords one of the best means of extracting it. A watery infusion of opium is boiled with milk of lime, filtered, mixed with powdered sal-ammoniac, and again boiled. By this means the lime is converted into the chloride of calcium, the ammonia is volatilised by the heat, while the morphine is precipitated in an impure form, which admits of easy purification.

Morphine combines with acids to form crystallisable salts, which are readily soluble in water and in alcohol. Of these, the hydrochlorate (muriate), the acetate, the bimeconate, and other salts are much used in medicine. Apomorphia, a white crystalline powder with physiological properties like those of morphia, is obtained by heating morphia with an excess of hydrochloric acid.

The therapeutic uses of morphine and its salts are very similar to those of Opium (q.v.), but morphine is employed largely in cases where Hypodermic Injection (q.v.) is desired. The ordinary dose of morphine, or its salts, when given to an adult to allay pain or induce sleep, ranges from an eighth of a grain to half a grain. Many persons are addicted to the habitual use of morphine. The effects are very much the same as those of opium, and it is taken for the same reasons; but morphine is more rapid in action and more efficacious, and is not accompanied by some inconveniences which attend the use of opium. The habitual abuse has its origin in the legitimate use as a medicinal agent. But when the habit is established, the evil consequences soon set in, though some constitutions suffer much more than others. As a rule, *habitués* become pale, sallow, emaciated, appetite is diminished, digestion disordered, sleeplessness sets in, and defies extra doses of the drug. If, as is usual, the morphine is subcutaneously injected, all parts of the body within reach of the syringe may become one mass of sores, so that it is hard to find a place for a new injection. The will is enfeebled: the man or woman becomes a mere paralytic. A special hospital has been equipped in Paris for victims of this self-indulgence. See Sharpey on 'Morphinomania' in the *Nineteenth Century* (1887).

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Morphology (Gr. *morphē*, 'form'), the study of organic form and structure, the counterpart of physiology, which is concerned with habit and function. The term was first introduced by Goethe in 1817, and is now generally used to include 'the whole statical aspects of the organic world,' as expressed especially in anatomy, both descriptive and comparative, in histology, which is concerned with more minute structure, in palæontology or the study of extinct forms, and in so much of embryology as consists of structural investigations at different stages of development. But whether engaged with anatomical or histological, palæontological or embryological studies, the consistent morphologist always considers animals and plants at rest or dead, and analyses them into their parts; while the physiologist on the other hand studies organisms in action or life, and seeks to discover, at various levels of investigation, the physical and chemical changes associated with their activity. Thus, in short, morphology corresponds to the 'statics,' physiology to the 'dynamics' of the organism (see ANATOMY, BIOLOGY, EMBRYOLOGY, FUNCTION, PHYSIOLOGY). To the purely geometrical study of organic forms, their contour, axes, symmetry, &c.—a highly technical inquiry comparable to crystallography—Haeckel applies the special term *promorphology*.

The simplest task of the morphologist consists in *describing* form and structure, and the fulfilment of this with increasing thoroughness has placed taxonomy or classification on a sure basis. But this necessarily involves *analysing* the organism into its parts—organs, tissues, and cells—a method which led, for instance, to the establishment of the cell-theory (see CELL), and has been associated with a parallel deepening of physiological inquiry (see BIOLOGY). Then follows the work of *comparing* part with part, in a series of organisms or in the same organism, alike in living and extinct, in adult and young forms. This has led to the detection of fundamental similarities of structure or 'homologies' (see HOMOLOGY)—witness Goethe's reduction of the flowering plant to an axis bearing numerous modified or 'metamorphosed' appendages or leaves (see BOTANY, FLOWER); the comparison of oral and other appendages throughout the series of arthropods (see CRUSTACEA, INSECTS); the discovery of the segmented character of the vertebrate skull and brain; the recognition of the ovum as the common starting-point in the life-history of all organisms, or of the gastrula as a predominant stage in the development of animals; the tracing of the embryonic layers to their derivatives in the adult (see EMBRYOLOGY); and so on throughout the triumphs of comparative anatomy and embryology. Finally, the facts of evolution have given the morphologists warrant for yet wider generalising, in which the results of anatomy and histology, embryology and palæontology, legitimately alloyed with physiological considerations, are welded together into the principles of differentiation.

See the Introduction to Gegenbaur's *Comparative Anatomy* (trans. by Jeffrey Bell, 1878); Haeckel, *Generelle Morphologie* (1866); Hatschek, *Lehrbuch der Zoologie*; standard text-books of Zoology and Botany, and the histories of these sciences by Carus and Sachs respectively; W. His, *Unsere Körperform* (1875), and also 'On the Principles of Animal Morphology,' *Proc. Roy. Soc. Edin.* xv. (1888); Herbert Spencer, *Principles of Biology* (1864).

Morphy, PAUL. See CHESS.

Morris, GEORGE PERKINS, author of 'Woodman, Spare that Tree,' was born in 1802 in Philadelphia, founded the *New York Mirror* and afterwards the *Home Journal*, with both of which N. P. Willis was associated, and died in New York, 6th July 1864.

Morris, GOUVERNEUR, an American statesman, was born in Morrisania, New York, 31st January 1752, graduated at King's (now Columbia) College in 1768, and was admitted to the bar in 1771. He early showed a talent for finance, and took an active share in the political affairs of the Revolution period. In May 1780 he lost a leg through a fall from his carriage in Philadelphia. From 1781 to 1784 he was assistant to Robert Morris, superintendent of the national finance. In 1787 he took his seat as a delegate in the convention that framed the United States constitution, and the year after sailed for Paris, where for two years he devoted himself to private business. The greater part of the year 1791 he spent in England as a confidential agent of Washington's, and next served till August 1794 as United States minister to France. Returning to America in 1798, he sat for New York in the United States senate from 1800 to 1803, and was chairman of the New York canal commissioners from 1810 till his death, 6th November 1816.

See *Memoirs of Gouverneur Morris, with Selections from his Papers and Correspondence*, by Jared Sparks (3 vols. Boston, 1832), and *Gouverneur Morris*, by Theodore Roosevelt, in the 'American Statesman' series (1888), also *The Diary and Letters of Gouverneur Morris*, edited by his granddaughter, Anne Cary Morris (2 vols. 1889). The last contains many interesting glimpses of Paris in the fever of Revolution.

Morris, LEWIS, a copious writer of verse which has attained an extraordinary popularity, was born in Carmarthen in 1832, and educated at Sherborne School and at Jesus College, Oxford, where in 1855 he graduated first-class in classics, and won the Chancellor's prize. He was called six years later to the English bar, and practised till 1881, when he accepted the post of honorary secretary to the university of Wales. In 1877 he was elected an honorary fellow of Jesus College. Mr Morris's first offerings of verse appeared in 1871, when under the pen-name of 'A New Writer' he published *Songs of Two Worlds*, which at once passed into numerous editions, and which was followed in 1874 and 1875 by a second and third volume. In 1876 appeared *The Epic of Hades*, the work with which the author's name is usually associated; it has run into several series, and these series into many editions. He has since published *Gwen, a Drama; The Ode of Life; Songs Unsung; Gycia, a Tragedy;* and *A Vision of Saints* (1890), &c., which have shown no falling off in popularity.

Morris, WILLIAM, the poet, was born in 1834, and educated at Marlborough and at Exeter College, Oxford, where he formed an important and lasting friendship with Burne-Jones, the famous painter. He himself studied to be a painter, but without success, his artistic temperament being destined to have play in another direction. In 1858 he published a small volume entitled *The Defence of Guenevere and other Poems*, which passed almost unnoticed at the time; but in 1867 he won the attention and admiration of every true lover of poetry by a long narrative poem entitled *The Life and Death of Jason. The Earthly Paradise* (3 vols. 1868–70) confirmed his high reputation. This work is made up of twenty-four legendary and romantic poems of classic or of Gothic origin, recited by Norwegian seamen who had sailed westward to find the earthly paradise. Mr Morris has since published *Love is Enough* (1873), the *Æneid* of Virgil done into English verse (1876), and *The Fall of the Niblungs, a Poem* (1877). In collaboration with Mr Eirikr Magnusson he has translated from the Icelandic *Grettir the Strong*, *The Story of the Volsungs and Niblungs*, and *Three Northern Stories*, and in 1890 began the publication

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of English versions of the *Sagas*. Of late years Mr Morris has declared himself a Socialist, and his numerous writings and speeches in support of Socialistic doctrines have left him less time and inclination for poetry. Five lectures, *Hopes and Fears for Art*, appeared in 1882. His early work is his best; indeed, his first volume is his best, and if he is to live at all it will be by reason of *The Defence of Guenevere*. These thirty lyrics, mediæval in matter—deeply mediæval in tone and colour—are instinct with life, their characters 'flesh and blood under their chain-armour, and the trappings of their tabards.' With the bulk of Mr Morris's work it is different. It were impossible to praise too highly the exquisite and sustained beauty of form, of melody, of colour. The author is the best of story-tellers; he is unsurpassed in the simple freshness of his natural descriptions and the rippling music of his verse. But the people of his later poems hardly breathe the breath of life at all. They are but beautiful shadows, and the poems, it has been well said, are fit reading for sleepy summer afternoons. For such work one cannot predict long life. Still from us who are of the present is there not due a great debt to the writer who has led us away from the doubt and mental conflict, from the hideousness and materialism, of modern life into a beautiful garden of dreams? In 1863 Mr Morris and others founded the establishment for the manufacture of wall-papers, stained glass, tiles and artistic household decorations, which has since been carried on by him, and has largely contributed to reform English taste in colour and design (the article on painted or stained glass, Vol. V. p. 246, is by him).

Morris-dance. This rustic dance, formerly an accompaniment to the May-day games and Whitsun-ales, and not yet obsolete in England, is probably of Moorish origin. Douce conjectures it was introduced into England in the reign of Edward III. by John of Gaunt on his return from Spain; but Strutt was of a different opinion, maintaining that the Morisco or Moor dance differed from the morris-dance as practised in England, having been accompanied with castanets or rattles at the end of the fingers, and not with bells attached to various parts of the dress. The principal performers of the morris-dance were Robin Hood, Maid Marian, the hobby-horse, and the Bavian or fool, the number of actors having varied at different times. Shakespeare has several allusions to the morris-dance; the music and whimsical attire of the actors being referred to by Beaumont and Fletcher.

Morrison, ROBERT, the founder of Protestant missions in China, was born of Scottish parentage at Morpeth, in Northumberland, 5th January 1782. He studied at one of the Independent colleges, and in 1807 he was sent to Macao and Canton by the London Missionary Society. In February 1809 he was appointed translator to the East India Company's factory at Canton, and by 1814 he had completed the translation and printing of the whole of the New Testament. Four years later, by the help of William (afterwards Dr) Milne, he had done the same with the Old Testament; and in 1823 he completed and printed his great *Chinese Dictionary* in six large quarto volumes, at an expense to the East India Company of £12,000. It occupied him for sixteen years, and in connection with it he had accumulated a library of 10,000 Chinese books. It contained 40,000 words expressed by Chinese characters, and was afterwards translated into Japanese. In 1816 he acted as interpreter to Lord Amherst. In 1818 he established an Anglo-Chinese College at Malacca. When he returned to England in 1824, he brought with him his collection of books, ultimately presented to the Council of University College, London. After visiting France, Ireland, and Scotland, he in 1826 returned to China. In 1834 he accompanied Lord Napier to Canton as interpreter, and died there 1st August. Besides the works already mentioned, he is the author of *Horæ Sinicæ* (1812), being translations from the popular literature of the Chinese, a *Chinese Grammar* (1815), and *Chinese Miscellany* (1825). In 1839 his widow published his *Memoirs*. See also Townsend's *Robert Morrison* (1888).

Morristown, capital of Morris county, New Jersey, on the Whippany River, 30 miles by rail W. of New York. It is a pleasant summer-resort, with some historic associations, and has ironworks and various mills; 3 miles to the north is a large state lunatic asylum. Pop. (1885) 8760.

Morse. See WALRUS.

Morse, SAMUEL FINLEY BREESE, American artist and inventor, was the eldest son of Rev. Dr Jedidiah Morse, geographer, and was born at Charlestown, Massachusetts, April 27, 1791. He graduated at Yale College in 1810, and visited England with the American painter Washington Allston, to study painting with him and Benjamin West. In 1813 he received the gold medal of the Adelphi Society of Arts for his first effort in sculpture, the 'Dying Hercules.' Returning to New York in 1815, he became the first president of the National Academy of Design, which was established in 1826, and filled the office till 1842, and was appointed professor of the Arts of Design in the university of the city of New York in 1835. He did not give his entire attention to art, but devoted much study to chemistry, especially to electrical and galvanic experiments; and on a voyage from Havre to New York in 1832 he conceived the idea of a magnetic telegraph, which he exhibited to congress in 1837, and vainly attempted to patent in England. His claims to priority of invention over Professor Wheatstone in England have been the subject of considerable controversy (see TELEGRAPH). He struggled on heroically against scanty means until 1843, when at length congress, at midnight, in the last moments of the session, appropriated 30,000 dollars for an experimental telegraph line between Washington and Baltimore. Morse lived to see his system of telegraphy adopted in France, Germany, Denmark, Sweden, Russia, and Australia. Honours both from home and abroad were heaped upon him, and an international present of 400,000 francs was given him in 1858, at the instance of Napoleon III. A bronze statue was erected to him in New York in 1871. He died in New York, 1872. See the Life by S. I. Prime (New York, 1875).

Morshansk, a town of Russia, 58 miles N. of Tamboff and 149 by rail W. by N. of Penza, has distilleries and an active trade in wheat, hempseed, and tallow. It was almost burned to the ground in 1874. Pop. 21,190.

Mortality. The subject of general tables of mortality is discussed at INSURANCE; see also VITAL STATISTICS. Weekly 'Bills of Mortality,' weekly reports as to christenings and burials, were first prepared by the parish clerks of London about 1592–93, in consequence of the frequent recurrence of the plague. The area 'within the old bills of mortality' was gradually increased, till in 1726 it extended to 21,587 acres. In 1801 the 'New Tables of Mortality' gave the registration district an area of 30,000 acres, which has also been extended till 'Registration London' had in 1871–81 an area of 75,362 acres. See LONDON.

Mortar, a short and very thick piece of artillery of large calibre, firing a heavy shell at a fixed

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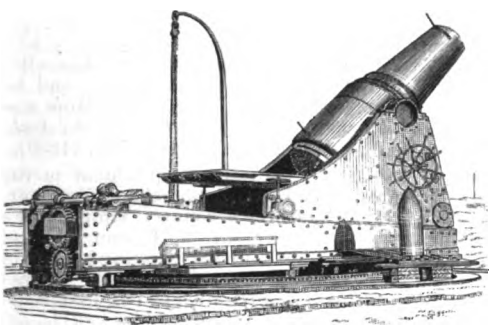
angle of 45° or thereabouts, so that the projectile may strike the object aimed at in a direction more or less vertical. The range is regulated by the amount of powder used, which, being placed in a chamber completely closed by the projectile, produces its maximum effect. Mortars are particularly useful at sieges, as their 'high-angle' fire enables them to search out the interior of the works, and against ships whose decks offer a vulnerable target to such fire. The common type of mortar is a muzzle-loading smooth bore of 5½, 8, 10, or 13 inch calibre, firing a spherical shell; but rifled mortars and elongated shells were used by the Germans at the siege of Strasburg in 1870; and the United States have a very powerful weapon in their 12-inch breech-loading rifled mortar or



howitzer, shown in the figure. With a charge of 35 lb. of powder and 60° elevation, this weapon will project a shell 1630 lb. in weight a distance of 5½ miles with such accuracy that five out of seven shots would injure a vessel at that distance. The Russian artillery have a so-called field-mortar weighing only 9 cwt., and firing a 46-lb. shell. This weapon is 3 feet long and of 6-inch calibre, but being fitted with elevating gear is better classed as a howitzer. It is breech-loading, effective up to 4000 yards, and as mobile as an ordinary field-gun. Very large mortars have been tried at times, as at the siege of Antwerp citadel in 1832, when the French brought one of 24-inch calibre to the attack. This monster, owing to its unwieldiness and other causes, was a failure. Larger still is Mallet's 36-inch mortar, constructed in 1855, of iron parts welded together, and now in Woolwich Arsenal. Only two or three rounds have been fired from this weapon, as it showed signs of cracking after being discharged.

Mortar. See CEMENTS.

Mortara, EDGAR, a Jewish boy who, on 23d June 1858, was forcibly carried off from his parents by the orders of the Archbishop of Bologna, on the plea that he had, when an infant, been baptised into Christianity by a Roman Catholic maid-servant. The manner of the boy's abduction, and the refusal of the Roman Catholic authorities to give him up to his parents, becoming known throughout Europe, excited great indignation, more particularly in England. But the boy remained in the hands of the Roman Catholic Church, and became an Augustinian monk.

Mortar-vessel, a class of gunboat for mounting sea-service mortars. Mortar-boats were a smaller kind. The most ancient form of mortar-vessel was the 'bomb-ketch,' convenient because of the length of deck without a mast. In the British naval service these several kinds of bomb-ships have ceased to exist.

Mortgage, in English law, is a contract whereby property is transferred to a creditor by way of security for money advanced. A mortgage of land is, in form, an absolute conveyance, subject to a proviso that, if the money lent is repaid within a certain time, the mortgagee shall reconvey the land to the mortgager or borrower. Even when the time fixed has expired, equity will permit the mortgager to redeem his property on payment of his debt: if he proves unable to do so, the mortgagee may apply to the court for a sale of the property, or for foreclosure—i.e. for a decree which deprives the mortgager of his right to redeem and transfers the property absolutely to the mortgagee. A mortgagee may also, as a general rule, enter into possession of the land and draw the rents and profits; or he may sue the mortgager for payment of the money due. Further rights may be given him by agreement, and it was formerly usual to stipulate for large powers over the property. The Conveyancing Act of 1881 now regulates the powers exercised by mortgager and mortgagee respectively, unless in so far as its provisions are excluded by express agreement. An equitable mortgage is effected when an owner of property binds himself by memorandum or otherwise to execute a formal mortgage. A person who deposits the title-deeds of his land with a banker, as a security for money advanced, is an equitable mortgager. Mortgage deeds do not, with certain exceptions, require Registration (q.v.). An owner who has mortgaged not unfrequently obtains further advances on the security of a second or third mortgage of the same property. A third mortgagee who buys up the first and gets possession of the title-deeds is permitted to tack the first and third mortgages together: both will have to be paid off before the second. There are also cases in which a mortgagee is permitted to consolidate claims against different properties of the same debtor, requiring him to pay off all or none. No trustee is justified in advancing money on security of any but a first mortgage; and in every case a trustee is bound to see that the value of the property is amply sufficient to secure the amount advanced. See on this point the Trustee Act, 1888.

A mortgage of goods is made by means of the deed known as a Bill of Sale (q.v.). Shares, policies of insurance, and even debts, may be mortgaged by using the appropriate forms of transfer. In all cases, whatever the nature of the property, the Conveyancing Act enables the mortgagee to obtain a sale of the property, if the mortgager is unable to pay principal and interest. See Coote's *Law of Mortgage* (5th ed. 2 vols. 1884).

In Scotland mortgages are effected by means of a Bond and Disposition in Security (see BOND). Mortgages are a higher and better form of security than in England, because of the system of registration of deeds affecting land (see SASINE); and trustees have power to invest in mortgage securities, which are considered as safe as government stock, and less liable to fluctuations of interest. In Scotland it is not the practice to mortgage lands by mere deposit of title-deeds.

In the United States the form and incidents of a mortgage are regulated by the laws of each state. Except in Louisiana, the English law seems to have been accepted on the basis of American legislation. The Homestead Laws (q.v.) enacted by several states have an important influence on the law of mortgage. See L. A. Jones, *Law of Mortgages* (3d ed. Boston, 1888).

Mortification, in Scotch law, is a term used to denote lands given for charitable or public uses.

Mortification, in Medicine. See GANGRENE, INFLAMMATION.

Mortimer. See EDWARD II. and III.; and for Mortimer's Cross, see HEREFORDSHIRE.

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Mortlake, a parish of Surrey, on the south bank of the Thames, 2 miles ENE. of Richmond and 8 W. by S. of London. From 1619 to 1703 it was famous for its tapestry works; now malting and brewing are the leading industries. It is also a great boating-place, the Oxford and Cambridge race being rowed from Putney to Mortlake. It has associations with Archbishops Anselm and Cranmer, the astrologers Dr Dee and John Partridge, Cromwell, Swift and Stella, Sir Philip Francis, Sir Richard Owen, and Sir Richard Burton. Pop. (1851) 3110; (1881) 6330. See John E. Anderson's *History of Mortlake* (priv. printed, 1888).

Mortmain (Fr. *morte main*) signifies in law the dead hand of a corporation. At an early period (1279) the English parliament took note of the mischief which resulted from the transfer of land to religious corporations; statutes were passed restricting the right of corporations generally to hold land. At the present day a corporation, whether it be a college or a railway company, cannot acquire and dispose of land, except in so far as its charter or act of parliament authorises it to do so. The statutes of mortmain were directed against corporations generally; the so-called Mortmain Act of 1736 was apparently intended to guard against improvident gifts of land by will for charitable purposes. The provisions of the statutes of mortmain and the Mortmain Act have been repealed and, in substance, re enacted by the Mortmain and Charitable Uses Act, 1888. Money given to purchase land, and moneys charged upon land, are within the provisions of these acts. Land situated in Scotland, in the colonies, or in foreign countries is not within the policy of the English statutes. In Scotland the common law put a somewhat similar check on deathbed alienations of land; but this check has been abolished by statute. In the United States the laws of several states limit the amount of real estate which may be held by religious bodies and charitable societies; and the laws of the United States impose a limit in the Territories.

Morton, JAMES DOUGLAS, EARL OF, regent of Scotland, was born in the first quarter of the 16th century, the younger son of Sir George Douglas of Pittendriech, near Edinburgh. In 1553, in right of his wife Elizabeth, daughter of the third Earl of Morton, he succeeded to the title and estates of that earldom. He joined the Reformers in 1557; in 1561 was sworn a privy-councillor; and in 1563 was made Lord High Chancellor. Having borne a foremost part in Rizzio's assassination (1566), he fled with his associates to England, but, through Bothwell's interest, in eight months obtained his pardon from the queen. He was privy to the design for Darnley's murder, but was purposely absent from Edinburgh on the night of the tragedy (1567); and, on Bothwell's abduction of Mary, he joined the confederacy of the nobles against them. He figured prominently at Carberry Hill; discovered the 'Casket Letters;' led the van at Langside (1568); and, after the brief regencies of Moray, Lennox, and Mar, in November 1572 was himself elected regent. His whole policy was directed in favour of Elizabeth, from whom in 1571 he was receiving bribes; and his high-handed treatment alike of the nobles and of the Presbyterian clergy, his attempts to restore episcopacy, and the avarice and rapacity imputed to him, daily swelled the number of his enemies, who already included all Mary's adherents. He seemed to have retrieved his temporary downfall by the seizure two months later of Stirling Castle (May 1578); but Esme Stuart in 1580 completely supplanted him in young King James's favour; and on 2d June 1581, as 'art and part' in Darnley's murder, he was beheaded with his own 'Maiden' in the Edinburgh Grassmarket. 'He died proudly, said his enemies, and Roman-like, as he had lived; constantly, humbly, and Christian-like, said the pastors who were beholders.'

See DOUGLAS, MARY QUEEN OF SCOTS, and JAMES VI., with works there cited; also Mr T. F. Henderson's article in vol. xv. of the *Dict. of Nat. Biog.* (1888).

Morton, JOHN, Cardinal, and Archbishop of Canterbury, was born at Milborne St Andrew, in Dorsetshire, about 1420, studied at Cerne Abbey and Balliol College, and practised as advocate in the Court of Arches. Holder of various ecclesiastical preferments and a member of Privy-council, he adhered with great fidelity to Henry VI., yet by Edward IV. was made Master of the Rolls and Bishop of Ely. Richard III. imprisoned him, but he escaped, and joining Henry VII. was by him made Archbishop of Canterbury and chancellor (1486). In 1493 he became a cardinal; and he died 15th September 1500. Sir Thomas More was a page in his house. See Hook's *Lives of the Archbishops* (1867), and Gairdner's *Henry VII.* (1889).

Morton, LEVI PARSONS, vice-president of the United States, was born at Shoreham, Vermont, 16th May 1824, was first a country storekeeper's assistant, then partner in a Boston firm of merchants, and in 1863 founded banking-houses in New York and London. In 1878 and 1880 he was returned to congress as a Republican; in 1881–85 he was minister to France; and in 1888 he was elected vice-president of the United States.

Morton, SAMUEL GEORGE, an American physician, born in Philadelphia, January 26, 1799, studied medicine there and at Edinburgh, and in 1839 was appointed professor of Anatomy in the Pennsylvania Medical College. He died May 15, 1851. Morton may be regarded as the first American who endeavoured to place the doctrine of the original diversity of mankind on a scientific basis. His great works are *Crania Americana* (1839) and *Crania Egyptica* (4 vols. 1844); and his museum of comparative craniology, preserved at Philadelphia, contains some 1500 skulls—900 of them human.

Morton, THOMAS, dramatist, was born in 1764 in the county of Durham, but, left an orphan, was brought up by an uncle in London. He entered Lincoln's Inn, but soon quitted law for play-writing, and produced *Speed the Plough* (1798, with its invisible 'Mrs Grundy'), *The Blind Girl* (1801), *Town and Country* (1807), *School for Grown Children* (1826), &c. For thirty-five years he lived at Pangbourne, near Reading, till in 1828 he removed to London, where he died, 28th March 1838.—His son, JOHN MADISON MORTON, the author of *Box and Cox*, was born at Pangbourne, 3d January 1811, and was educated in Paris and Germany (1817–20), and then at Clapham under Dr Richardson (1820–27). From 1832 to 1840 he held a clerkship in Chelsea Hospital, and between 1835 and 1885 wrote close on a hundred farces, of which *Box and Cox* (1847) alone is said to have brought him £7000. But the rise of burlesque was his ruin, and in 1881 he became a 'poor brother' of the Charterhouse. See an article by Clement Scott in *London Society* for January 1886.

Morula. See EMBRYOLOGY.

Morvan, LE, a barren district of France, a north-easterly extension of the central plateau (see FRANCE, Vol. IV. p. 770), is mainly in the department of Nièvre (q.v.).

Morvern, a peninsula of north-west Argyllshire, between Lochs Sunart and Linnhe. It is the 'Highland parish' of Norman Macleod.

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Morwenstow, or MOORWINSTOW, a parish in the extreme north of the Cornish coast, 7 miles N. of Bude; pop. 810. Its church, dedicated to St Morwenna, is mainly of Norman date; R. S. Hawker (q.v.) was its vicar.

Mosaics. Mosaic work (Lat. *opus musivum*) consists of small pieces of diversely coloured marble, glass, or other substances set together so as to produce a geometrical or artistic design. Mosaics are principally used for ornamental floors and pavements, and for the permanent artistic decoration of the walls of churches and other public buildings. The art is of ancient origin; by the book of Esther we may infer that it was practised in the days of Ahasuerus; but among the Romans it was very common, for scarcely have the remains of any ancient Roman villa been discovered without finding in it a mosaic pavement. These ancient pavements being composed of small tesseræ or dice of coloured marble, and rarely also of glass, are known as tesselated mosaics. The pieces used consist of irregular cubes varying from a quarter to half an inch in size, and they are carefully bedded in a cement surface set over a prepared concrete foundation. The designs, pictorial or otherwise, are produced by selecting and setting together, in proper position and relation, tesseræ of the required colour and size. The most famous tesselated mosaic of ancient Rome now existing is that obtained from Hadrian's villa at Tivoli, preserved in the Capitoline Museum at Rome, and known as 'Pliny's pigeons' from the subject it depicts. Under the Byzantine empire mosaic became a distinctively Christian art, employed for decorating the walls of churches with figures of the Saviour, apostles, saints, &c., and the remains of such Byzantine art form a link of great importance between classical and mediæval periods. The art was revived in Italy about the beginning of the 13th century, when it was employed with great effect for the decoration of churches; and since that time it has remained, with many fluctuations, a distinctively Italian pursuit. Modern mosaics are also made in Russia, forming a department of the imperial glass manufactory at St Petersburg; and in Paris some excellent work has been done. The cubes of opaque glass for mosaic pictures, technically called smalts (Ital. *smalto*), are of all possible varieties of colour, as many as 25,000 shades being prepared. With these the finest gradations in tone may be produced, and copies of any painting may be made, but mosaics of real artistic significance are simple in composition, and broad and sober in treatment. Italian mosaics are of two distinct classes—Florentine and Roman, the former being composed of pieces of stones or shells of natural colours shaped and inlaid in marble slabs according to the design to be produced; but it is limited in its application chiefly to floral scrolls and Arabesque designs. This variety of mosaic is extensively produced in India, having been there introduced by the Frenchman Austin de Bordeaux in the decoration of the famous Taj Mahal at Agra, whence it is distinguished as Agra work. Roman mosaic is made up of the small cubes above mentioned, and, while the larger wall decorations are composed of pieces which may be half an inch in size and upwards, small mosaics are composed of almost microscopical squares, these being used by jewellers for the ornamentation of brooches, small boxes, and miscellaneous bijous. Mosaic pavements are extensively made of small cubes or tesseræ of coloured marbles, and baked clay or terra-cotta similar to the ancient Roman tesselated pavements.

See Thomas Morgan, *Romano-British Mosaic Pavements* (1886); Parker's *Church Decorations and Mosaic Pictures* (*Archæol. of Rome*, vol. xi. 1876); and Gerspach, *La Mosaique* (1883).

Mosasaurus, a huge fossil reptile, belonging to the remarkable group of Pythonomorphs or 'sea-serpents,' which suggest both lizards and snakes. The remains of three species have been disinterred from Cretaceous strata. They were aquatic animals, furnished with paddles, and are estimated to have attained a length of as much as 75 feet (see REPTILES).

Mosaylima, or MOSEILEMA ('Little Moslem'), one of the most important rivals of Mohammed, belonged to the clan Dûl, a division of the tribe of the Beni Hanifah, of Yamâma in Nejd. The traditions about his life and age are extremely contradictory and legendary. It appears, however, tolerably certain that he had risen to some eminence in his tribe, probably as a religious teacher only at first, before Mohammed assumed his prophetical office. It was in the ninth year of the Hegira that Mosaylima, at the head of an embassy sent by his tribe, appeared before Mohammed, in order to settle certain points of dispute. Shortly after this event Mosaylima openly professed himself to be a prophet as well as Mohammed. The latter sent a messenger to him, as soon as he heard of this, to request him to reiterate publicly his profession of Islam. Mosaylima's answer was a request that Mohammed should share his power with him. 'From Mosaylima, the Apostle of God,' he is said to have written, 'to Mohammed, the Apostle of God. Now let the earth be half mine, and half thine.' Mohammed replied: 'From Mohammed, the Apostle of God, to Mosaylima, the liar. The earth is God's: He giveth the same for inheritance unto such of his servants as He pleases, and the happy issue shall attend those who fear Him.' Yet notwithstanding these testimonies, of probably late dates, it seems, on the other hand, perfectly certain that Mohammed made very great concessions to his rival—concessions that point to his having secretly nominated Mosaylima his successor, and that he by this means bought Mosaylima's open allegiance during his lifetime. It was not a question of dogmas, though they each had special revelations, but a question of supremacy which was thus settled amicably.

After Mohammed's death, in the 11th year of the Hegira, it at last came to an open breach between the two rival powers. Abu Bekr, the calif, sent Khalid, 'the Sword of the Faith,' with a number of choice troops, to compel Mosaylima to submission. Mosaylima awaited the enemy at Rowdah, a village in the Wadi Hanifah. So formidable indeed was Mosaylima's force that Khalid is said to have hesitated for a whole day and night. On the second morning, however, he advanced, and, in a battle which lasted until the evening, contrived, with fearful losses of his own, to gain the victory, in which Mosaylima fell, and his heresy was practically stamped out. It is extremely difficult to come to any clear notion of Mosaylima's real doctrines, as all the accounts that have survived of them come from victorious adversaries. See Sir W. Muir, *Annals of the Early Caliphate* (1883).

Mosch'eles, IGNAZ, pianist and musical composer, born at Prague, 30th May 1794, of Jewish parents, was between 1808 and 1816 the favourite musician and music-master of Vienna. Settling in London in 1825, he taught at the Academy of Music and directed at the Philharmonic Concerts. From 1844 he laboured at the conservatory in Leipzig until his death, 10th March 1870. A brilliant performer on the piano and an able composer, Moscheles ranks high amongst modern writers for the pianoforte. He also edited, in English,

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Schindler's *Life of Beethoven* (1841). See the Life by his wife (Eng. trans. 1873), and his Correspondence with Mendelssohn (Eng. trans. 1888).

Moschus, Greek bucolic poet, usually designated of Syracuse in Sicily; he flourished *circa* 150 B.C., and wrote in a style of almost painfully finished elegance an epitaph on Bion, a couple of short epics, and minor poems. His works are generally printed along with those of Theocritus and Bion; and there is a fine prose translation of the three, with an introduction, by Andrew Lang (1889).

Moscow, formerly the capital of Russia, and still venerated as such by the Russian peasantry, stands on the little river Moskwa, a sub-tributary of the Volga, 403 miles by rail SE. of St Petersburg, 768 ENE. of Warsaw, and 967 NNE. of Odessa. The city, a rude rhomboid in shape, measures 7 miles by 9 along its diameters, and covers some 40 sq. m. of area. Its centre is the enclosure called the Kreml or Kremlin ('Citadel'), which is surrounded by walls, crowned by eighteen towers and pierced by five gates. This enclosure is the most sacred spot in all the vast Russian empire. The stranger equally with the native pilgrim, on entering its Saviour gate (1491), must doff his cap to the holy icon of the Saviour that surmounts it. The most notable of the religious buildings inside the Kremlin are the cathedral of the Assumption, built originally in 1326 and rebuilt in 1475–79; its interior is encrusted with mosaics and jewelled ornaments, adorned with venerated pictures, and sanctified by numerous relics of saints; within its walls the early czars and all the Russian metropolitans and patriarchs have been consecrated, and the metropolitans buried. The cathedral of the Archangel was originally built in 1333, but restored in 1505; here were buried the Russian czars down to Ivan Alexievitch, brother of Peter the Great. The cathedral of the Annunciation (1489; rebuilt 1554) was formerly the private chapel of the czars; it shelters some remarkable paintings by Rubleff (1405). There are numerous churches of minor rank, and several monasteries; in the Voznesenski monastery (1393) the czarinas and female relatives of the czars are buried. In 1600 Boris Godunoff built in the Kremlin the Ivan Veliki tower, 270 feet high, the summit of which commands a magnificent view of Moscow, with her gilded cupolas and fantastic towers, her half Asiatic, half European architecture. Close by, at its foot, stands the gigantic bell, Czar Kolokol ('king of bells;' see BELL). The more important secular buildings within this sanctuary of Moscow are the imperial palace (1849); the palace built in the reign of Ivan III.; the new palace Orushenaya, which serves as a museum of the most valuable Russian antiquities; the palace of the patriarchs, with archæological treasures and 1500 rare Russian and Greek MSS.; the arsenal (1701–36), before which is the trophy of 1812, a pile of 800 or 900 French cannon; and the Hall of the Synod, with a valuable library and ecclesiological collections. Outside the Kreml the chief objects of interest are the colossal 'Temple of the Saviour' (1838–81), a building commemorative of 1812; the cathedral of St Basil (1554), a 'nightmare in stone,' with fantastic towers; the gigantic bazaar (Gostinoi Dvor); the historical museum; the library (10,000 vols. of old printed books and 600 MSS.) of the synod and its typographical museum; the university (1755), with scientific collections and a library of 170,000 vols.—it is frequented by 3350 students; the public museum (1861), containing a library of 300,000 vols. and 5000 MSS., a first-rate ethnological museum, a gallery of pictures, and scientific collections; the Golitzyn Museum (1865), with 20,000 vols. and a collection of paintings; an observatory; a large foundling hospital (1764); and numerous monasteries and special educational institutions. Moscow is celebrated for its excellent scientific societies. The suburbs of the city are thickly

Cathedral of St Basil, Moscow.

sprinkled with palaces, parks, and monasteries, some of the first and last being of great historic significance.

Next to St Petersburg, Moscow is the busiest industrial city in the empire, manufacturing cotton and woollen goods, silks, leather, tobacco, candles, metallic articles, machinery, paper, chemicals, bricks, carriages, pottery, and watches, all on an extensive scale. But the city occupies an even higher position as a commercial mart. Situated nearly in the centre of European Russia, midway between the Baltic, the Black Sea, and the Caspian, it is one of the principal meeting-places of the streams of Asiatic and European commerce. In the 14th, and more especially the 15th century, it was of even greater importance than it is to-day as a commercial mart. An enormous trade is done in grain, collected from the provinces and exported through the Baltic ports; in timber, from the northern governments; in furs, hides, tallow, and cattle; in the mineral products of the Ural region; in tea, sugar, and other groceries; in cotton, silk, and woollen goods, and in all the various manufactured wares of Russia. The Moscow customs office levies annually £6,000,000 to £7,000,000 on merchandise entering the city bounds. Pop. (1864) 365,000; (1884) 753,469, nearly all Great Russians of the Orthodox Greek Church. As a general rule the temperature ranges from a winter mean of 14° F. to a summer mean of 66°, the annual mean being 40°.

Previous to its settlement by Great Russians in the 12th century, the site had been occupied by Finnish races. The young state was greatly imperilled in its first years by the Mongols, who sacked the town in 1237 and 1293. But by the beginning of the 14th century its princes had secured their position, and began to make conquests and annexations on all sides. In 1325 the metropolitan of central Russia moved his seat to Moscow; a few years later the principality of

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Vladimir was united to that of Moscow; the Kremlin, built in 1300, was in 1367 encircled with stone walls. Moscow continued to grow in area and in political influence, and Ivan III. (1462–1505) assumed the title Czar of all Russia. Its prosperity received serious checks in the next century: it was nearly wholly burned to the ground in 1547, was taken and burned by the Khan of the Crimea in 1571, was hard pressed by the Mongols in 1591, and was the scene of riots arising out of the behaviour of the large Polish retinue who accompanied the bride of the Czar Demetrius early in the 17th century. During the whole of that century the people frequently rose against the czars and their unworthy favourites. In 1713 Peter the Great founded St Petersburg and made it his capital; but the old merchant families, the old conservative nobles, and the common peasantry still continue to look upon 'Moscow the Holy' as the real capital of the empire. The city again suffered greatly from fires in 1739, 1748, and 1753, and the cup of misfortune was filled to the brim when the city was set on fire and burned in 1812, according to the traditional belief the patriotic act of its own inhabitants to save it from Napoleon and the French (see NAPOLEON). Since then the city has been in great part rebuilt. —The *government* of Moscow has an area of 12,855 sq. m., and a pop. (1887) of 2,210,791.

Moselle (Ger. *Mosel*), a left-hand affluent of the Rhine, rises at the south-west extremity of the Vosges Mountains in France, at an elevation of about 2412 feet. Its course is north-westerly as far as Toul, passing Epinal on the way; thence it proceeds in a north-easterly direction (latterly, with many zigzag picturesque windings) through Luxemburg and Rhenish Prussia, and joins the Rhine at Coblenz, flowing on its way through Metz, Thionville, and Treves. Its entire length is 315 miles, and it is navigable up to Frouard, 214 miles from Coblenz. Its principal tributaries are the Meurthe, Seille, and Saar on the right, and the Orne, Sure, and Kyll on the left. The wines grown in the basin of the Moselle are noted for their lightness and their delicate aromatic flavour.

Moselle was formerly a frontier department in the north-east of France, but the greater part of it was taken by Germany after the war of 1870–1871, and became as of old part of Lorraine. The small portion left to France was joined to the department of Meurthe. Pop. of Moselle in 1866, 452,157. See MEURTHE-ET-MOSELLE.

Moser, MARY, flower-painter, was the only woman, besides Angelica Kauffmann, ever elected an Academician. Her father, a Swiss, George Michael Moser (1704–83), was an enameller and gold-chaser, the first keeper of the Royal Academy; and she herself died Mrs Lloyd, at a great age in 1819.

Moses (Heb. *Môsheh;* LXX. and Vulgate, *Môyses*), the great lawgiver and judge, under whose leadership Israel first began to be a nation. The whole subsequent course of Hebrew history and literature bears witness to the greatness of his fame and influence; but the details of his life preserved in that literature, though sometimes very minute, are not, as a whole, very full or satisfying. This was felt to be the case even when it was believed that the so-called 'Books of Moses' were written by him, and, therefore, so far autobiographical; and now that the Pentateuch (q.v.), or rather Hexateuch, is held not to have taken its present form till at least 800 years after his death, and the historical traditions which it embodies are seen to be of various dates and to represent various phases of growth, the outline of his life and character has become dimmer than ever. He still remains, nevertheless, a great historical figure. If we adopt the now very generally accepted belief that Meneptah or Merienptah was the Pharaoh of the Exodus (see EGYPT, Vol. IV. p. 240), Moses was born in the first half of the 14th century B.C. At the time of his birth the 'children of Israel' (*B'ne Israel*) were a pastoral people who had long dwelt on the eastern fringe of the Nile delta, where it begins to merge into the Arabian desert. His name—for which a Hebrew interpretation ('drawn;' the verb is the same as in Psalms, xviii. 16) is offered in Exodus, ii. 10—is now generally supposed to be really of Egyptian origin (perhaps *mes* or *messu*, 'son,' 'child'). His life divides itself into three periods of forty years each (a definite for an indefinite number), during two of which he had long and intimate experience, first of the civilised life of Egypt, and afterwards of the simple nomadic life of the desert. Ultimately he became the acknowledged leader of Israel in the movement for civil and religious freedom which led to the Exodus. Thenceforward the scenes of his activity were principally Sinai, 'the Olympus of the Hebrew peoples,' En-Mishpat or Kadesh (Gen. xiv. 7), a locality of which the site is not certainly known, and the plains of Moab to the east of Jordan. The greater part of the time was no doubt passed at Kadesh, which seems to have long been the national headquarters. Here his energy and force of character, combined with a conciliatory meekness (Numb. xii. 3) which has become proverbial, enabled him to establish the beginnings of the national organisation on an enduring basis. At the foundation of the commonwealth as outlined by him lay the theocratic idea, and the faith which had for its formula 'Jehovah is the God of Israel, and Israel is the people of Jehovah.' Although there is evidence that the name Jehovah was not unknown in pre-Mosaic times, it was not until now that it became a national watchword. Among the religious institutions possessed by Israel were some which their forefathers had carried with them in their early migrations from Chaldea, and others that had been more recently acquired in Egypt. To the former class belonged the fundamental institution of sacrifice, and also, possibly, that of the Sabbath; on the other hand it seems probable that the ideas connected with an ark and a separate priesthood had the later origin. The practices resting on these Moses, as a 'prophet,' extended, regulated, and reformed. It was as a member of the priestly caste (he belonged to the tribe of Levi) that at the sanctuary and oracle of Jehovah at the 'Well of Judgment' (En-Mishpat) he exercised the functions of law-maker and judge, and so laid the foundations of that 'Torah'—i.e. 'instruction' or 'law'—which, handed on by oral tradition and enriched by ever-broadening precedents, ultimately passed into writing in more than one form as the 'Mosaic legislation.' It does not appear that writing was much used in these early days; and most modern critics are agreed that the historical portions, as well as almost all the legislative documents, of the Pentateuch belong to a much later time. The poetical compositions which are attributed to Moses—the so-called 'Song of Moses' (Deut. xxxii.) and Psalm xc.—also give internal evidence of more recent authorship.

After the close of the Old Testament canon Jewish tradition still busied itself about the story of Moses; some of its later additions have been preserved in the writings of Philo and Josephus (cf. Acts, vii. 22), and many more in the Palestinian Targum on Exodus. For a good popular study of the life of Moses, see Rawlinson's *Moses: his Life and Times* (1887). A more critical point of view is represented in Wellhausen's *History of Israel* (1885), pp. 429–440; Reuss's *Geschichte des Alten Testaments* (2d ed. 1890); Renan's *Histoire du Peuple*

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d'Israël (vol. i. 1887; Eng. trans. 1887); and Kittel's *Geschichte der Hebräer* (1888). Ample references to the literature of the subject are given by Reuss.

Mosheim, JOHANN LORENZ VON, a distinguished church historian of Germany, was born at Lübeck on 9th October 1694, studied at Kiel, became in 1723 professor of Theology at Helmstedt, in 1747 at Göttingen, as well as Chancellor of the University. Here he died, 9th September 1755. His theological works are numerous, amongst which are a work on Bible morality and *Heilige Reden.* But his most important work belonged to the department of church history, his *Institutiones Historiæ Ecclesiasticæ* (1726; improved ed. 1755) being familiar to every student as a work of great learning and accuracy. Its author is, in Gibbon's phrase, 'full, rational, correct, and moderate.' It has been translated from the original very elegant Latin into English and other languages. The best English translation is that by Dr James Murdock (3 vols. New York, 1832). Other works were *Institutiones Historiæ Christianæ Majores* (1763); *De Rebus Christianorum ante Constantinum Commentarii* (1753); *Dissertationes ad Historiam Ecclesiasticam pertinentes* (2 vols. new ed. 1767); and a *Ketzergeschichte* (2 vols. 1746–48). Mosheim's standpoint is that of liberal orthodoxy; and his greatest work remains a monument of erudition and insight from the point of view of the impartial observer.

Moskwa, a branch of the Volga's tributary, the Oka, rises in a marsh in the east of Smolensk, flows east to the city of Moscow, and thence 112 miles south-east to the Oka. Its total course is 305 miles. It is navigable from its mouth to Moscow, except between November and April, when it is generally frozen, and is connected directly with the Volga by the Moskwa Canal.

Mosque, a Mohammedan house of prayer. The word is derived, through the Italian *moschea,* from the Arabic *mesjid,* 'a place of prayer.' The form of the oldest mosques is evidently from that of the Christian basilica (see ARABIAN ARCHITECTURE). The original forms became, however, entirely obliterated in the progress of Mohammedan architecture, and the mosques, with their arcaded courts, gateways, domes, and minarets, became the most characteristic edifices of Saracenic art. Wherever the Mohammedan faith prevailed, from Spain to India, beautiful examples of these buildings exist. They vary considerably in style in different countries, the Saracens generally borrowing much from the architecture of the various nations who adopted their faith. In India the mosques have many features in common with the temples of the Jains (see the section on architecture in INDIA, and the illustration at AGRA), while in Turkey they resemble the Byzantine architecture of Constantinople. Everywhere the dome is one of the leading and most beautiful features of the mosques, which commonly consist of porticoes surrounding an open square, in the centre of which is a tank or fountain for ablution. Arabesques and sentences of the Koran inscribed upon the walls, which are generally whitewashed, and never bear any device representing a living thing, are the only ornaments of the interior. The floor is generally covered with mats or carpets; there are no seats. In the south-east is a kind of pulpit (*mimbar*) for the imám; and in the direction in which Mecca lies (the Kibleh), there is a niche (*mihrab*) towards which the faithful are required to look when they pray. Opposite the pulpit there is generally a platform (*dikkeh*), surrounded by a parapet, with a desk bearing the Koran, from which portions are read to the congregation. The five daily prayers, which are generally said at home on week-days, are said in the mosque by the whole congregation on Fridays and certain other days, together with some additional prayers, and at times a sermon is superadded to the service. It is not customary for women to visit the mosques, and if they do, they are separated from the male worshippers. On entering the mosque, the Moslem takes off his shoes, performs the necessary ablutions, and finishes by putting his shoes and any arms he may have with him upon the matting before him. The chief officer of a mosque is the nazir, under whom are two imáms, a kind of religious official, in no way to be compared with what we understand by a clergyman of a creed, but who performs a certain number of religious rites, and, being very badly remunerated, generally has to find some other occupation besides. There are further many persons attached to a mosque in a lower capacity, as Muezzins (q.v.), door-keepers, &c., all of whom are paid from the funds of the mosque itself—generally derived from lands. With many of the larger mosques there are schools, academies (medresselis), and hospitals connected, and public kitchens, in which food is prepared for the poor.

Mosquito (dim. of Span. *mosca,* 'a fly'), a name applied to various troublesome gnats, for the most part belonging to the genus Culex, though sometimes members of the adjacent family Simulidæ. They are very widely distributed, especially in tropical countries, but also in the far north, as in Arctic America, Lapland, and Siberia. The numerous species to which the popular title mosquito is justifiably applied are not yet known with sufficient precision. Yet the entomologists catalogue 150 species of Culex alone, of which 35 occur in Europe, and most of these bite sorely enough to be ranked as mosquitoes. In hot summers the cry is sometimes heard that mosquitoes have appeared in Britain from the Continent or even from America. Importations no doubt occur; but the fact is that mosquitoes are always with us under the name of gnats. In hot weather they often appear in great swarms, especially in low countries, and the temperature seems to exaggerate their venomous voracity and our sensibility too. In places where they abound complete protection from their notoriously intense bites is almost impossible, but 'mosquito-curtains' of very fine gauze are most useful safeguards at night. The natives of various countries smear themselves with oil or grease, and sometimes sleep with their bodies almost buried in sand. It is noteworthy, however, that some people are much less susceptible and sensitive to mosquito-bites than is the case with the great majority. In some countries an additional terror is associated with mosquitoes, since they seem to be the host of the embryonic stage of *Filaria sanguinis hominis,* a parasite of man associated with the loathsome disease of Elephantiasis (q.v.). For the structure and life-history of most mosquitoes, see GNAT.

Mosquito Coast, or MOSQUITIA, formerly an independent state under the protectorate of Britain, lies on the east side of Nicaragua (q.v.), to which it has belonged since 1860. The coast-lands are low and swampy, but the interior rises into mountains, and is healthy. The characteristic products of the West Indies are grown. The inhabitants are a mixed race, of Indian and African blood, and number about 15,000. The chief town is Bluefields (pop. 500). The Mosquito Coast was discovered in 1502 by Columbus, and, though never conquered, was claimed by Spain. During the 17th century it was the rendezvous of the Buccaneers (q.v.), and was subjected to Britain in 1655, who only abandoned it in 1850.

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Mossamedes, a seaport on Little Fish Bay, in Angola, the Portuguese territory on the West Coast of Africa. Pop. 2000.

Mosses (*Musci*). The mosses are a class of small flowerless plants, important in the economy of nature, and of great interest in their life-history. They are found in all climates, but are most abundant in temperate regions and in damp places. They are included with the Liverworts in the division Muscineæ, which is sharply separated from the higher division of Vascular Cryptogams (Ferns, &c.) by the absence of vessels; while the lower members of the group consist of a mere flat thallus, and are thus related to the Thallophytes. This, with other characters, indicates that the Muscineæ form an independent branch of the tree of evolution, and are not an intermediate type.

The uses of mosses in medicine and the arts are few and unimportant, but in mountain-regions the thick felts of moss and deep beds of peat soak up the rain, and so prevent floods from sudden storms, and in dry weather supply the streams through weeks of drought. With favouring surroundings the life of a moss-plant seems to be endless; the mosses (Sphagnum) we see growing to-day in a bog are the tips of plants which began life perhaps thousands of years ago, and which have formed a great bed of peat, which may be 20 feet thick. This social habit of moss is a peculiarity. In some species cushions of marvellous regularity are formed; it enables individual plants to stand erect, and is of great importance in the process of fertilisation. The capsules of many mosses must be familiar to every one as small sacs at the ends of their hair-like stalks, which rise in great numbers from a moss-cushion. These contain the spores, from each of which when sown there grows in a few days a tiny thread-like plant, the protonema. Buds of young moss-plants soon appear on this, and then, as a rule, the thread-plant dies. A moss-plant consists of a stem with leaves and roots. The roots will grow out from any part of the plant that is kept dark and damp; they are very like the

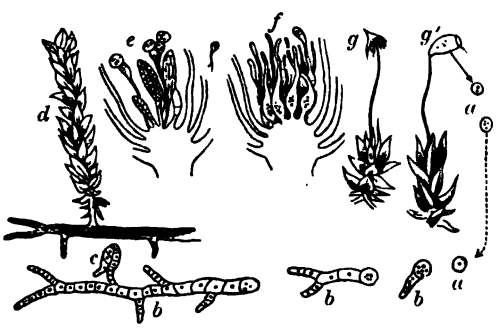

Diagram of the Life-history of a Moss:

a, spore; *b*, spore producing the thread-like underground protonema; *c*, bud from protonema which will rise into moss-plant; *d*, a leaf-bearing portion of moss-plant: *e*, apex of moss-plant with club-shaped male organs (antheridia) producing male cells, one of which lies between *e* and *f*; *f*, apex of moss-plant with bottle-shaped female organs (archegonia) within which is the female cell; *g*, *g'*, spore-producing generation which grows from division of fertilised egg-cell and upon the female plant.

protonema, indeed buds of new plants may arise on them. Even from a detached leaf roots and new plants will grow; this is a sign of the simple nature of the tissues. By their branching habit, and by the death of the older parts, which leave the branches as separate plants, and in many species by the growth of special buds which are easily separated from the parent, mosses are rapidly propagated, indeed in many species the production of spores is rare. The sexual mode of reproduction is as follows. At the apex of a plant about midsummer may often be seen what are popularly known as moss flowers. These consist of a rosette of numerous leaves, smaller than ordinary, a sort of bud in fact. In the centre are male and female organs (antheridia and archegonia), but in some species the male are on one plant, the female on another; within the 'flowers' are also barren leaves known as paraphyses. The antheridia are club-shaped bodies; when ripe, if they are wetted, they burst; the contained cells are squeezed out as a gelatinous mass; within each cell is a small motile 'antherozoid;' this, owing to the nearness of the plants to one another, is able to swim away if the moss is thoroughly wet. The archegonia are flask-shaped; within them lies, in the bottom of the flask, the large egg-cell; in the neck a row of 'canal cells;' these, when the egg-cell is ready, swell up and form a jelly. If an antherozoid is near, it enters the jelly, and working down to the egg-cell fertilises it. The ovum now grows within the flask, which for a time grows with it, forming the 'calyptra;' but after a time the flask is split, and the growing embryo forces its way down into the parent plant, and is *nourished by it*. When fully grown it is the capsule containing spores, of which we have already spoken, and thus the life-cycle of the moss is completed. This cycle consists of two generations, the moss-plant which produces an egg; from the egg grows a plant which produces spores, but itself remains attached to the parent plant. This is called an alternation of generations. The fern has a similar story, but in this case the spore-bearing generation is the conspicuous plant. Fossil remains have been found in rocks of Palæozoic age.

Classification.—There are some 3000 species; these are divided into four orders. (1) Bryaceæ, which include the vast majority of genera. The sporangium always has a cap, 'calyptra,' which, when ripe, is blown away by the wind; beneath this is a lid, 'operculum,' which splits off from the capsule, exposing the spores. The capsule has a long stalk, 'seta.' The commonest forms are Funaria, Polytrichum, &c. (2) Phascaceæ, a small order; the spores are set free by the rotting of the sporangium; the protonema persists until the maturity of the sporangium. (3) Andreaceæ, a single genus; no operculum; the sporangium opens by 4–8 longitudinal slits. (4) Sphagnaceæ, bog mosses; some of the cells of the leaves grow larger than the rest, lose their contents while their walls become spirally thickened; these cells open one into the other; the smaller cells are filled with chlorophyll, and form a network round the large empty ones. The tissue of the stem is in the centre a sort of pith; outside this a layer of long cells with thick walls; outside this an epidermal layer of large empty cells. The male and female organs are either on separate branches or separate plants.

See articles Liverworts, Ferns, Generations (Alternation of). Also Ruskin, *Proserpina;* Goebel, *Outlines of Classification and special Morphology* (Oxford); Bennett and Murray, *Handbook of Cryptogamic Botany;* and works on British mosses by Stark, Holmes and Gray, Bagnall, and Hobkirk.—The so-called Irish moss (see Carrageen) is a seaweed. Corsican moss and Ceylon moss are names of algæ (of the genus Plocaria) used for producing an edible mucilage. Iceland Moss (q.v.) is a lichen.

Mostaganem, a town of Algeria, on the coast, 45 miles NE. of Oran, manufactures pottery and has corn-mills and tanneries. Pop. (1886) 12,395, more than one-third being Europeans. It was a place of 40,000 inhabitants in the 16th century; and has again grown up from its decayed state since the French took possession in 1833.

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Mostar, formerly the chief town of Herzegovina, on the Narenta, about 35 miles from the Adriatic and the terminus of a railway running 27 miles down the valley. It takes its name (='old bridge') from a Roman bridge of one arch, 95 feet in span, has numerous mosques, and is the seat of a Roman Catholic and a Greek bishop. Wine is produced, and swords and tobacco manufactured. Pop. (1885) 12,655.

Mosul, a decayed town of Asiatic Turkey, in the province of Al-Jezireh (ancient Mesopotamia), is situated on the right bank of the Tigris, opposite the ruins of ancient Nineveh (q.v.), 200 miles up the river from Bagdad. It is partly surrounded by crumbling walls. During the middle ages it was a very prosperous city, with much industry—*muslin* takes name from this town; now its bazaars are filled with the manufactures of the West, and almost the only export is gall-nuts, from the Kurdish mountains. Mosul was formerly the metropolis of the Mesopotamian Christians (the Nestorians, the United Chaldæans, the Jacobites, &c.), and still contains many Catholic Christians. Pop. estimated at 30,000. The town, which existed in 636, enjoyed its greatest prosperity in the 9th century, and onwards, until the desolating inroads of the Mongols in the 12th. Then came the Seljuks; and they were followed by the Turks, and since then Mosul has steadily declined.

Motacillidæ. See WAGTAIL.

Motazilites, a 'heretical' Mohammedan sect, founded by Wasil b. Ata in the 2d century after Mohammed. They denied predestination, and recognised in man a power over his own actions.

Mote-hill. See FOLKMOOT.

Motett, a name applied to two different forms of musical composition—(1) a sacred cantata, consisting of several unconnected movements, as a solo, trio, chorus, fugue, &c.; (2) a choral composition, generally also of a sacred character, beginning with an introduction in the form of a song, perhaps with figurative accompaniment; after which follow several fugue subjects, with their expositions, the whole ending either with the exposition of the last subject, a repetition of the introduction, or a special final subject. A motett differs from a double or triple fugue in that the subjects never appear simultaneously, but are introduced one after the other. In one form of the motett the successive phrases of an entire chorale are treated as so many fugal subjects.

Mother Carey's Chicken, a name (a corruption of *Mater cara*) familiarly given by sailors to the Stormy Petrel and other small oceanic species of Petrel.—The name MOTHER CAREY'S GOOSE is, in like manner, given to the Great Black Petrel or Gigantic Fulmar (*Procellaria gigantea*) of the Pacific Ocean (see articles on PETREL and FULMAR).

Mother of Pearl. See PEARL.

Motherwell, a town of Lanarkshire, 12 miles SE. of Glasgow. Owing its rapid growth to the amazing extension of its mineral industries, it has a good water-supply (1877), municipal buildings (1887), a public park (1887), large iron and steel works, &c. Pop. (1841) 726; (1861) 2925; (1871) 6943; (1881) 12,904; (1890) 20,000.

Motherwell, WILLIAM, a Scottish poet and antiquary, was born in Glasgow, 13th October 1797, and educated in Edinburgh and at the grammar-school of Paisley, where, in his fifteenth year, he entered the office of the sheriff-clerk. At the age of twenty-one he was appointed sheriff-clerk depute of the county of Renfrew. In 1819 he published his first work, the *Harp of Renfrewshire*, containing biographical notices of the poets of that district from the 16th to the 19th century. This work was but the prelude to one of far greater importance—his *Minstrelsy, Ancient and Modern* (1827). In 1828 he commenced the *Paisley Magazine*, in which some of his finest original pieces first saw the light, and in the same year accepted the editorship of the *Paisley Advertiser*, a Conservative journal. In 1830 he became editor of the *Glasgow Courier*. In 1832 he published a collection of his best poems, entitled *Poems Narrative and Lyrical*. He died in Glasgow, November 1, 1835, at the early age of thirty-eight. Motherwell displays in his best moods (but *only* then) a rich, beautiful, and strong imagination, great warmth and tenderness of feeling, and a thorough knowledge of the technique of a poet. His *Jeanie Morison* is unsurpassed for the mingled pathos and picturesque beauty of its reminiscences of boyish love; and the little piece beginning, 'My heid is like to rend, Willie,' has seldom been read without tears. An enlarged edition of his poetical remains, with a memoir, was published in London in 1849.

Motherwort (*Leonurus cardiaca*), a plant of the natural order Labiatæ, found about hedges and in waste places in Europe, and now abundantly naturalised in some parts of North America. It is not very common in Britain, and probably has been introduced. It is perennial, has a branched stem about 3 feet high, stalked leaves, the lower ones 3-lobed, and crowded whorls of reddish-white flowers. The plant was formerly in much use as a domestic pectoral medicine, but is now comparatively little employed. It has a strong, but not agreeable smell.—Other species of the same genus are found in Europe and the north of Asia.

Motherwort (*Leonurus cardiaca*).

Moths, a sub-order of Lepidopterous insects, which in twilight and darkness take the place of the light-loving butterflies. Technically known as Heterocera, they are distinguished from the butterflies or Rhopalocera by the antennæ, which are variable in form instead of being constantly club-tipped, and by the fact that the wings are usually expanded, and not elevated, when the insect is at rest. Like the parallel series of butterflies, the moths differ greatly from one another in size and colour, habit and diet. The giant owl-moth of Brazil (*Thysania agrippina*) measures nearly a foot across from tip to tip of expanded wings, while the smallest are hardly visible to unaided eyes. They are represented in most parts of the world, and are usually very prolific. The larvæ or caterpillars feed mostly on living plants, and in this connection are very familiar; others of these ravaging forms ruin clothes, furs, and the like. Most of the latter belong to the family Tineidæ, especially to the genus Tinea. They are the 'moths' *par excellence*, against whose ravages housewives carefully guard. Clothes should be kept perfectly dry, and the

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wardrobe, chest, &c. containing them should have no cracks or crevices. Pieces of camphor, sprinkled pepper, and strongly odoriferous 'moth-powder' of some sort will help to keep the adult moths away; but when a host of larvæ have possessed the garment it may be immersed in boiling water, carbolic acid, &c., or burned as hopelessly spoilt. Almost the only directly useful form is the Silk-moth (q.v.). There are separate articles on the Hawk Moth, Death's-head Moth, Gooseberry Caterpillar, &c.; see also BUTTERFLY, CATERPILLAR, INSECTS.

Motif, in a musical composition, means the principal subject on which the movement is constructed, and which, during the movement, is constantly appearing in one or other of the parts, either complete or modified. In elaborate and long compositions there are also secondary motifs.

Motion, LAWS OF. In developing the subject of Dynamics (q.v.) it is convenient to lay down in the form of postulates axioms or the fundamental principles on which the science is based. These axioms are generally referred to as the laws of motion. They rest ultimately, as do the axioms of geometry, upon our experience; and once the terms in which they are expressed are sufficiently understood, the laws themselves are admitted without further question. We owe to Newton what still remains the most serviceable, because the most concise and at the same time complete, expression of these dynamical axioms. Newton's predecessors, particularly Galileo, had already formulated some of the fundamental principles of abstract dynamics; but in the Three Laws of Motion, which form the basis of the *Principia*, we have for the first time all the necessary and sufficient principles laid down in a manner easy to understand and easy to apply. These three laws are given both under DYNAMICS and under FORCE, and need not be reproduced here.

Newton's *method* of presenting his definitions and axioms has been made the subject of much criticism. And doubtless a logician, confining his attention to the eight definitions of mass, momentum, inertia, force, acceleration, &c., and the three laws of motion, could easily discover faults of logical arrangement. Nevertheless, taking this preliminary section of the *Principia*, with its masterly scholia, *as a whole*, and bearing in mind that the aim is to establish a theory of dynamics that shall harmonise with the facts of experience, we shall find no difficulty in admitting the soundness of Newton's principles. There is absolutely no confusion of thought. The demands on our intellectual faith, whether explicitly stated or implicitly involved in other statements, are essentially rational. The treatment is luminous as it is profound. Attempts have been made to substitute a more logical procedure; but all such attempts lead to intricate phraseology and a corresponding intricacy of dynamic conception quite beyond the powers of apprehension of the tyro. And even when all is done it is doubtful if the strict canons of logic are quite satisfied. It may be safely said that, as an introduction to the study of dynamics, Newton's laws of motion, along with the definitions of the physical quantities involved, have not as yet been surpassed.

The train of thought running through Newton's method may be thus described. Everything dynamical that happens in nature consists of changes of position and motion of the parts of a material system. Fixing our attention on one body or particle in the system, we soon perceive by experience that its changes of motion or (more strictly) momentum relatively to the other parts of the system must depend on the mechanism connecting it with these parts. With this mechanism, however, we do not at first explicitly concern ourselves. For it we substitute the conception of force, or its time-accumulation, impulse, which we regard as the external something causing the observed change in momentum and measured by that change. This force may be constant or variable in space, or it may depend on the velocity of the body. On these conceptions and definitions we base the simplest department of abstract dynamics —that known as the dynamics of a particle. Many of its theorems are found to be very approximately realised in the falling of bodies, in the flight of projectiles, in the motions of planets and comets round the sun. But before we can pass to the dynamics of material systems we must restore the bonds we severed when we introduced the idea of force acting on a single particle. This Newton completely effected by his third law, in which every force is recognised as being only the half of a whole, the other half being the equal but oppositely directed reaction. This means that whatever change of momentum may be observed to be taking place in one particle must be balanced by an equal and opposite change of momentum occurring elsewhere. Thus, the momentum of a material system as a whole can never change, however much its configuration may alter, in virtue of the mutual actions of its parts. And in this statement we may readily recognise the generalisation of the first law of motion—commonly called the Law of Inertia—in its application to any complex material system, dynamically isolated, and considered as a unity. Newton's very remarkable second interpretation of the third law, given at the end of the scholium attached, implicitly contains, as was first pointed out by Thomson and Tait, nearly the whole of the modern doctrine of energy. It is discussed under that heading. See also FORCE for the discussion of the Second Law.—For Motion in Plants, see IRRITABILITY, PLANTS, SENSITIVE PLANTS, SPORE; for animal locomotion, see FLYING, HORSE, &c.

Motley, JOHN LOTHROP, historian and diplomatist, was born in Dorchester, Massachusetts, April 15, 1814. He had an inheritance of wit and literary taste as well as of fortune, and had all timely advantages of education and travel to make him the 'picked man of countries' which he became. He attended the school at Northampton, Massachusetts, kept by Dr Cogswell and Bancroft the historian, and at the age of thirteen entered Harvard College, graduating in 1831. He next studied in German universities, and at Göttingen was the intimate friend of Bismarck. His reading was various and enormous, especially in poetry and fiction, and in modern languages. He 'toiled terribly' afterwards, when he made the studies for his history, but his early assiduity was like that of a bee in a flower-garden. He was naturally a favourite in society, as he was tall and exceedingly handsome, with a captivating manner. His resemblance to Lord Byron was striking. He was married in 1837 to Miss Benjamin, a lady of beauty and accomplishments. In 1839 he published his first work, an historical novel, entitled *Morton's Hope*. Its brilliant pictures were admired, but it was not successful. His second novel, *Merrymount*, was partly a protest against the gloom of Puritanism, and was more favourably received; yet it was evident that the genius of the author was not to be displayed in fiction. When, afterwards, the splendour of Motley's style lighted up the great scenes of history, as, for instance, the abdication of Charles V. in the town-hall of Brussels, it was seen that his ardent and imaginative nature had found its predestined place. His studies early turned in this direction, but

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fully ten years were consumed in his preparations, and in completing his *History of the Dutch Republic*. This work, published in 1856, established his fame, and was translated into many languages, the French version being supervised by Guizot. The labours which were the indispensable foundation of the work can be comprehended best from the author's own account, which will be found in a letter printed in Dr Holmes' *Memoir of Motley* (1878). This letter is furthermore valuable as a sketch of his intended work, which was to be continued to 1648, the peace of Westphalia—a vast design which he did not live to accomplish. In 1857 he was once more in Boston, and contributed to the *Atlantic Monthly* a paper on Florence. But he soon returned to Europe, as the materials for European history were not accessible in the United States. The first part of his *History of the United Netherlands* appeared in 1860. The capacity for research and the power of pictorial representation were combined in this as in the preceding work.

The civil war in the United States aroused the deepest feeling in Motley, and his letters to the London *Times* upon the policy of the British government were probably the most important and decisive of all the efforts made by patriotic Americans to enlighten the British public upon the momentous issues involved. In 1861 he was appointed minister to Austria, and remained until 1867, when he resigned in consequence of a foolish attack made upon him. In 1868 the second part of the *History of the United Netherlands* appeared. In 1869 he was appointed minister to Great Britain, but was summarily recalled the following year, under circumstances which made the recall an indignity. There had grown up a deadly feud between Charles Sumner, senator from Massachusetts, and President Grant; and, as Motley and Sumner were intimate friends, the recall of the minister was designed as a blow at the senator. The pretext was that Motley had disregarded his instructions, but it is evident that his dismissal had been determined upon. Motley was cut to the heart, and brooded over his unmerited disgrace to the day of his death.

His next and final work was *The Life and Death of John Barneveld*, a biography which is virtually history, and a part of his main theme, though not a distinct continuation. After the death of his wife in 1874 Motley paid another visit to the United States. His severe labours and trials had impaired his strength, and he had had some slight attacks of apoplexy. After his return to England in 1876 he gradually sank, and died at Kingston Russell, the Dorsetshire residence of his daughter, Sir William Vernon Harcourt's wife, May 29, 1877. He was buried at Kensal Green.

The character of Motley is strongly impressed upon his works, and they are as far removed from annals as possible. His long studies, aided by his creative imagination, enabled him to make past ages live again, and to present historical personages with their own traits and manners. Few historians have given such illumination and stereoscopic reality to people and scenes described; and the same eager nature makes it impossible for him to attain to judicial impartiality. He glories in being a partisan—a partisan of progress, liberty, and humanity. Criticism has touched his narrations only in some minor details; of their general faithfulness there is no question.

Two large volumes of his correspondence were edited by George William Curtis in 1888. His own letters are picturesque, eloquent, and weighty by turns. Many of them are addressed to Dr Holmes, his most intimate friend. Bismarck's letters are naive and charming, giving a most unexpected and pleasing insight into the life and character of the great chancellor. The Memoir by Dr Holmes (1878) is an affectionate tribute. The appreciation of his works in Holland was most gratifying. Visitors to the Hague are shown the room in the Queen's Palace in the Wood where, by royal invitation, Motley lived and worked during his last visit.

Motril, a town of Spain, 31 miles S. by E. of Granada and nearly 3 miles from the sea, with sugar and cotton factories, and lead mines and works. Esparto grass is exported. The port is at Calahonda, 6½ miles SE. Pop. 16,665.

Motto, in Heraldry, a word or short sentence which forms an accompaniment to a coat-of-arms, crest, or household badge; it was called in Scotland the 'ditton.' In France and Scotland it was frequently placed above the crest, in England almost invariably below the escutcheon. A motto is sometimes a religious or moral sentiment, as 'Gardez la foi,' 'Humanitate,' 'Et decus et pretium recti' (Grafton); it is not unfrequently a heroic exclamation or war-cry, 'Courage sans peur,' 'Forward.' Sometimes it alludes to a peculiar tenure, as 'Free for a blast' (Clerk of Penicuik); while in a great many cases it bears reference to the crest, badge, or some bearing of the escutcheon. Thus, Stuart, Earl of Moray, has for crest a pelican wounding herself, and for motto, 'Salus per Christum Redemptorem.' Not a few mottoes are 'canting' or punning allusions to the family name—as 'Scuto amoris Divini,' for Scudamore; 'Ver non semper viret,' for Vernon; 'Fare, fac,' for Fairfax; 'Time Deum, cole regem,' for Coleridge; and 'Teneo quia teneor,' for Holden. Two mottoes are sometimes used by the same family—one above the crest, the other below the shield. The motto, 'Dieu et mon Droit,' which accompanies the royal arms of Great Britain, is supposed to have been a war-cry, and was used in England at least as early as the time of Henry VI. Its origin has been assigned to a saying of Richard I., 'Not we, but God and our right have vanquished France.' See Seton's *Law and Practice of Heraldry* (1863).

Mouflon (*Ovis Musimon*), the wild sheep of Corsica, Sardinia, central Asia, &c. See ARGALI, and SHEEP.

Moukden. See MUKDEN.

Mould, or MOULDINESS, the common name of many minute fungi which make their appearance, often in crowded multitudes, on decaying or diseased plants and animals and animal and vegetable substances. To the naked eye they often seem like patches of fine cobweb, which are shown by the microscope to consist of cellular threads. Their structure and history are described in the article FUNGI, from the systematic part of which it will be seen that the popular name is applied to many very different forms—e.g. the common White Mould (*Mucor mucedo*), the Bread Mould (*Eurotium Aspergillus-glaucus*), the mould of fruit and jam (*Penicillium glaucum*), &c. See also DRY ROT.

Classic Mouldings.

Mouldings, the curved and plane surfaces used as ornaments in cornices, panels, arches, &c., and in all enriched apertures in buildings. In classic architecture the mouldings are few in number, and definitely fixed in their forms. The illustration

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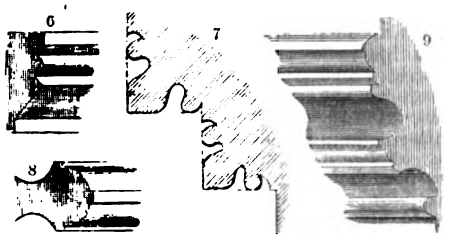
shows (1) the Echinus, (2) Cyma Recta, (3) Cyma Reversa, (4) Scotia, (5) Torus; another is the Fillet (q.v.); and each of these mouldings has its proper place assigned to it in each order (see COLUMN). In Gothic architecture, and all other styles, the mouldings are not reduced to a system as in the Greek and Roman styles, but may be used in every variety of form at the pleasure of the artist. Certain forms generally prevail at one period in any style. Thus, in Gothic architecture the date of a building may in many instances be determined by the form of the mouldings. The Norman mouldings were very simple in outline, and frequently enriched with the zigzag and billet ornaments. Fig. 6 is a common Norman form.

In the English style the mouldings are also simple in outline, and are usually arranged in rectangular divisions, as in fig. 7, and consist of



Various Mouldings.

alternate rounds and hollows. In late examples of this style the fillet was introduced (fig. 8) and led to the more elaborate form of mouldings during the Decorated period (fig. 9). The mouldings of the Perpendicular style are generally flatter and thinner than the preceding, and have large hollows separated by narrow fillets.

Moulins, the capital of the French department of Allier, on the right bank of the river Allier, here crossed by a handsome stone bridge of thirteen arches, lies 196 miles by rail SSE. of Paris and 124 NW. of Lyons. A clean, well-built town, with pretty promenades, it has a cathedral (1468–1871), the choir old; a square tower of the old castle of the dukes of Bourbon; a 15th-century belfry; and the chapel of a former convent. Marshals Villars and Berwick were natives, and Clarendon wrote here great part of his History. Nor must Sterne's Maria be forgotten. Pop. (1872) 19,774; (1886) 21,213.

Moulmein. See MAULMAIN.

Moultan. See MULTAN.

Moulting, a general name for the process by which birds lose some of their feathers, or crustaceans cast their cuticular shells, or young insects get rid of their outer husk in metamorphosis. The shedding of the hair in mammals and the sloughing of snakes, &c. are also analogous. See BIRD, CRAB, CRUSTACEA, HAIR, INSECTS, SNAKE, &c.

Moulton, LOUISE CHANDLER, writer, was born in Pomfret, Connecticut, 5th April 1835, married at twenty W. U. Moulton, a Boston publisher, and has published children's stories, novels, essays, and poems. Her stories are unaffected and well constructed, full of grace and tenderness; her verse reveals the rarer gift of lyrical music. Here may be named *Bedtime Stories* (1873; followed by a second series in 1875, and a third in 1880); *Some Women's Hearts* (1874); *Miss Eyre from Boston, &c.* (1889); and *In the Garden of Dreams* (1890), a volume of charmingly tender and pathetic verse.

Moultrie, FORT, a fortress on Sullivan's Island, at the mouth of Charleston Harbour, South Carolina, celebrated for the repulse of a British squadron commanded by Sir Peter Parker, 28th January 1776. The fort, which had 26 guns and 435 men, and was commanded by Colonel William Moultrie (1731–1805), had been hastily built of palmetto logs, in two rows 16 feet apart, with the space between filled with sand. The spongy wood of the palmetto was found to resist the cannon balls perfectly.

Moultrie, JOHN, minor poet, born in London in 1799, educated at Eton and Trinity College, Cambridge, took orders, and was presented in 1828 to the rectory of Rugby, where he enjoyed the friendship of Arnold. He died in 1874. Some little poems of deep tenderness in *My Brother's Grave* (1837), and *The Dream of Life* (1843), have kept his name from being quite forgotten; neither the praises of Wordsworth nor Praed could keep *Godiva* alive. There is a Memoir by Derwent Coleridge prefixed to an edition of his *Poems* (1876).

Mound-birds (*Megapodidæ*), a family of gallinaceous birds remarkable for the large mounds which they build as incubators for the eggs. They are natives of Australasia and of the islands in the Eastern Archipelago and Pacific. The Australian Megapodes (*Megapodius tumulus*), about the size of common fowls, build mounds of leaves, vegetable refuse, and soil, and add to them year after year until they become immense structures. The largest on record measured 150 feet in circumference. Both sexes work at the nest, in which the eggs are laid in separate holes at a depth of 5 or 6 feet, and left to be hatched by the warmth of the decomposing vegetable matter. The mound of the Nicobar species (*M. nicobariensis*) seems to be used not only by the original pair, but by their descendants as well. In a related genus, Leipoa, the eggs are laid separately in a circle in the centre of the mound, and then deeply covered up with compost. In the genus Tallegallus—represented by the large Brush-turkey (*Tallegallus lathami*) of Australia—the mounds are used socially by a number of birds.

Mound Builders, the name given to a vanished race of North America, by whose labour the remarkable earth mounds found in the United States were raised. These mounds exist in extraordinary numbers over all the country between the Alleghany and Rocky Mountains, but chiefly in Ohio, Illinois, Indiana, and Missouri; they are abundant in all the Gulf States, and even farther south, and they extend at least as far north as the Great Lakes. Their usual height is from 6 to 30 feet, with a diameter of 40 to 100 feet. The majority are simply conical burial mounds, mostly rising from 15 to 25 feet, though one in West Virginia is 70 feet high and over 300 feet in diameter at the base. But very many others of these mounds are defensive, and others again have a religious origin. The fortifications, usually earthworks raised on heights near some watercourse, embrace walls, trenches, watch-towers, and are too skilfully constructed to have been temporary defences: many archæologists believe that there was a connected line of defensive works from New York to Ohio. In the Mississippi Valley, where the largest mounds are, these forts disappear; and it is supposed that the principal enemies of the Mound Builders had their home in the east—perhaps in the Alleghanies. Some of the Ohio fortresses enclose over 100 acres, the walls of earth, winding in and out, in each case being several miles long. In the alluvial valleys other enclosures have been found, regular—circular, square, &c.—in shape; these have been called 'sacred enclosures,' but on very problematical grounds; and the same criticism applies to the identification of the smaller low mounds, from a few inches square to 50 by 15 feet, which have been called 'altars.' Of the 'temple' mounds, however, there are numerous examples, some very large: one in

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Illinois reaches a height of 90 feet, and measures 700 by 500 feet at the base; and another in Mississippi is 600 by 400 feet, and its topmost mound is 80 feet above the base. To these must be added the curious mounds constructed in the shape of animals, and sometimes extending to a length of 400 feet. They are most numerous in Wisconsin, but one of the most interesting is the serpent mound near Bush Creek, Ohio (figured and described in *The Century*, April 1890).

As to the identity of the Mound Builders opinions, of course, differ. The general tendency is to recognise their descendants in the Natchez and other kindred tribes whom the Spaniards found on the Mississippi, partly because their chief was both king and deity—he was regarded as the child of the sun—and so we find evidences of the religious feeling and the despotic power necessary to secure the accomplishment of such enormous works. The race may perhaps also have survived in the more highly civilised tribes whom De Soto and his followers met with in Florida and the other southern states. But a comparison of the Mound Builders' civilisation with that which prevailed in Mexico when Cortes landed, supplies very strong arguments for connecting these northern Indians, driven south by their nomadic enemies, with the tribes who came from the north and in turn expelled successively the Toltecs and one another, blending their more savage customs with the higher civilisation which they found there (see MEXICO). The contents of the mounds support this view. It is evident that the Mound Builders, like the later Mexican tribes, were in the transition stage between the stone and metal age; copper they had obtained in the same primitive manner as it was obtained in Mexico, but the weapons and tools were stone implements, and knives of obsidian especially—the well-known sacrificial knives of the Aztecs—were common. Their art and manufactures were both of a low standard; but it is well known that the invaders of the Mexican tableland partly absorbed the civilisation they found there, partly degraded it. Finally, it may be mentioned that the sepulchral mounds yield many evidences of the cruel rites of their builders; and the pyramidal form of the 'temple' mounds is reproduced in the *teocalli* of Mexico. See Squier and Davis, *Ancient Monuments of the Mississippi Valley* (1848); Conant's *Footprints of Vanished Races in the Mississippi Valley;* Thruston, *Antiquities of Tennessee* (1890); Shepherd, *Antiquities of Ohio* (1890); and Moorehead, *Fort Ancient, Ohio* (1890).

Mountain Ash. See ROWAN.

Mountaineering. See ALPINE CLUB.

Mountain-leather, &c. See AMPHIBOLE.

Mountain Meadow. See DANITES.

Mountains. Every one knows what a mountain is, and yet it is hard to give an adequate definition of the term. We may say vaguely that any region the surface of which rises with a more or less steep gradient to a height of 1000 feet or more is a mountain. Mountains differ vastly in form—some assuming pyramidal or conical shapes, others forming ridges, others occurring as irregular amorphous masses. Some again stand in more or less isolated positions, whilst in other cases very many crowd together, forming a billowy mass of elevated ground; and yet others, amongst which are the most prominent mountains of the globe, extend continuously in definite directions as long ranges and chains for hundreds or thousands of miles. Notwithstanding this diversity of form and of grouping, all mountains may be classified as—(*a*) mountains of accumulation, (*b*) mountains of elevation, (*c*) mountains of circumdenudation.

(*a*) *Mountains of Accumulation.*—Volcanoes may be taken as the type of this class of mountains (fig. 1). These are of course formed by the accumulation of igneous materials around the focus or foci of

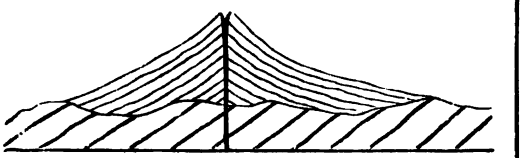

Fig. 1.—Volcano; Mountain of Accumulation.

eruption. Most volcanoes are more or less conical in shape; but in the case of those which have been long extinct the form has often been greatly modified by the denuding action of the subaërial agents. Some very ancient ones have been so demolished that frequently all that remains of them are mere stumps, formed of the hard crystalline rocks that plug up the pipes or flues through which the igneous materials found a passage to the surface. In former times lava seems often to have welled up along the lines of extensive fissures and flooded surrounding regions. This happening again and again, vast plateaus have been built up. These are called *plateaus of accumulation*. Many of these, however, have since been highly denuded, so that they have now quite a mountainous appearance (fig. 2). As examples

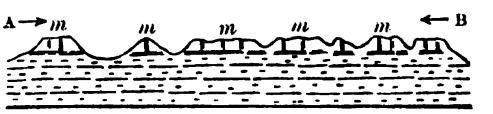

Fig. 2.—Plateau of Accumulation, A—B; showing Mountains of Circumdenudation (*m*, *m*).

may be mentioned the denuded plateaus of Iceland, the Faroes, Antrim and Mull, Abyssinia, and the Deccan. Of course plateaus of accumulation are not always formed of igneous rocks. Any area of approximately horizontal aqueous strata, were it to be elevated to a height of a thousand feet or so, would form a plateau of the kind, such as the plateau of the Colorado. That plateau is geologically of recent origin, and yet sufficient time has elapsed to allow of profound erosion of its surface. Thus, mountains and plateaus of accumulation often owe many of their present features to the action of denuding agents.

(*b*) *Mountains of Elevation* owe their origin to the folding, crumpling, and fracturing of strata that accompany certain great movements of the earth's crust. They are lines of weakness along which the rocks have yielded to excessive lateral compression by folding and doubling up, during the sinking down of the cool outer shell of the globe upon the more rapidly contracting hot nucleus. The simplest structure presented by such mountains is shown in the Uinta Mountains of Wyoming and Utah. This is a flattened arch of strata, having a breadth of 50 miles and a length of 150 miles, which bulges up to a height of 5000 or 6000 feet above the plains on either side. It shows a broad plateau-like surface which has been deeply eroded. Powell believes that a thickness of 3½ miles of strata has been denuded from its surface. In the Jura Mountains we have a series of parallel ridges, each ridge coinciding with a symmetrical anticlinal or saddle-backed arrangement of strata, while the intervening hollows occupy symmetrical synclinal troughs (fig. 3). The tops of the anticlines are all more or less denuded. In the western part of the same range of mountains the flexures of the strata are mostly

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unsymmetrical (fig. 4). In the Alps and mountain-ranges of similar character the flexures of the strata

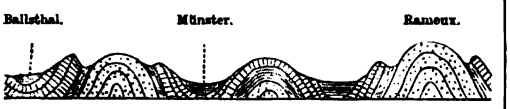

Fig. 3.—Symmetrical Flexures of Swiss Jura (Mountains of Elevation).

are frequently reversed—the beds being doubled back so that older strata are inverted and overturned upon younger beds. The accompanying section exhibits the principal features in what is known as the Alpine type of mountain structure

Fig. 4.—Unsymmetrical Flexures of Swiss Jura (Mountains of Elevation).

(fig. 5). A glance at the diagram will show that the greater features of the surface coincide approximately with the larger flexures of the strata, but

Fig. 5.—Section across a Mountain-chain (Elevation Mountains): *a*—*a*, Isoclinal Folds (showing inversion of strata); *b*—*b*, Symmetrical Folds.

that these features have been greatly modified by denudation. In such mountain-regions the highly flexed and contorted strata are frequently dislocated; but for the sake of clearness such dislocations are not represented in the diagram. Occasionally we find that the prominent features in a mountain-region have been determined by profound dislocations of the rocks, as is well shown in the parallel ranges of the Great Basin, of western Arizona, and of northern Mexico. That region has been divided into a series of long narrow blocks by a system of parallel dislocations—the prominent mountain-ridges corresponding to the blocks on the high or upcast side of the fractures. Although the direction and general form of those mountains are thus the result of earth-movements, the evidence of subsequent erosion and denudation is everywhere conspicuous.

(*c*) *Mountains of Circumdenudation.*—In countries composed of undulating and highly-folded strata which have been for long ages exposed to the action of eroding agents the ultimate form assumed by the ground is directly dependent on the character of the rocks and the mode of their arrangement (fig. 6). Plateaus in course of time come to be

Fig. 6.—Escarpments (*e*, *e*) and Hills of Circumdenudation (*h*, *h*).

deeply trenched in different directions and eventually lose their plateau character. The remaining portions of high ground then form groups of mountains and hills. In regions of horizontal or approximately horizontal strata the mountains assume the form of pyramids or flat-topped *mesas* and *buttes*, excellent examples of which are seen in the western territories of North America, and in the much-denuded basaltic plateaus of Iceland and the Faroe Islands (fig. 2). In regions of folded and contorted strata, composed of diverse kinds of rock, the orographic features are more variable. A highly-denuded plateau of folded strata seen from a height presents the appearance of a tumbled and billowy sea—the Scottish Highlands and the high grounds of Scandinavia being examples of mountains of circumdenudation which have been carved out of elevated plateaus of denudation (fig. 7). The origin of a plateau formed of such folded and contorted strata requires a word of explanation. Mountains of elevation are in the course of time denuded and degraded, and should the land of which they form a part remain long enough above the sea, the whole surface must

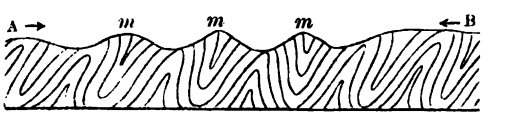

Fig. 7.—Plateau of Denudation, A—B; showing Mountains of Circumdenudation (*m*, *m*).

eventually be reduced to the condition of a low gently undulating plain. Should elevation now ensue, this plain becomes a plateau—the surface of which by-and-by is trenched and furrowed by running water, &c., as is the case with the ancient plateaus of Scotland and Scandinavia.

Age of Mountains.—As might have been expected, mountains are of all geological dates, and the age of a large number has been determined. But this has reference chiefly to those that owe their origin to accumulation (volcanic cones) or to compression and folding of strata during great earth-movements (mountains of elevation). Many of the latter are the result, not of one, but of several successive periods of uplift. It can often be shown that between those periods of movement the mountains have been subjected to long-continued erosion, and partially or even wholly submerged, while newer accumulations of sediment were gradually piled up over their denuded surfaces. The Pyrenees, the Alps, the Jura, the Himalayas, the Andes, and many other conspicuous ranges have been formed by successive upthrusts, separated by longer or shorter periods of degradation and sedimentation. Some mountains of elevation, which originated in very early geological times, appear to have been denuded down to their very roots—reduced to the condition of low-lying plains. Such plains have subsequently been pushed up bodily and converted into plateaus, which in the course of time have been profoundly modified by denudation, so as now to present the appearance of a rolling mountainous country—the mountains being mountains of circumdenudation (fig. 7). The greatest and loftiest mountains of elevation have all received their latest uplift in comparatively recent geological times. Amongst such young ranges we find that the larger orographic features coincide more or less closely with the greater convolutions, folds, and fractures of the strata. In ranges belonging to much older dates denudation has profoundly

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modified the original configuration of the surface—the present orographic features being the result of denudation, determined by the character of the rocks and the geological structure of the ground. Hence in such regions anticlinal mountains, which are weak structures, are almost unknown, while synclinal troughs, which are strong structures, in place of coinciding with valleys (as in the Jura Mountains, fig. 3), have often come to form mountainous ridges (figs. 6, 7).

Mountain-systems.—Some attempts have been made to group the various mountain-ranges of the world into systems, more particularly by E. de Beaumont, who maintained the synchronism of ranges situated on lines parallel to one another. The parallelism does not consist in having the same relations to the points of the compass—for these as regards north and south would be far from parallel—but is estimated in its relation to some imaginary great circle, which being drawn round the globe would divide it into equal hemispheres. Such circles were called Great Circles of Reference. But De Beaumont went beyond this, and proposed a more refined classification, depending on a principle of geometrical symmetry, which he believed he had discovered among his great circles of reference. These geometrical speculations have never commended themselves much to geologists. It has been demonstrated indeed that certain mountain-chains in widely separated regions belong approximately to the same geological age, and may really be strictly synchronous. But much more has yet to be known of the geological structure of the various ranges of the earth before any general grouping of these into systems can be considered reliable. See ALPS, GREAT BRITAIN (*Physical Geography*), HIMALAYA.

The following table shows the heights of some of the principal peaks in the several continents:

Asia.	Feet.
Everest, Himalayas	29,002
Dapsang, Karakorums	28,700
Tagarma, Pamir	25,800
Khan-tengri, Tian-shan	24,000
Africa.	
Kilima-Njaro	19,680
Kenia	19,000
Ruwenzori	18,000
Ligonyi	14,000
Australia and Polynesia.	
Charles-Louis, N. Guinea	20,000
Mauna Kea, Hawaii	13,805
Mt. Cook, New Zealand	12,349
Kinabalu, Borneo	11,562
Mt. Kosciusko, N.S. Wales	7,308

North America.	Feet.
Nevado de Toluca	19,454
Orizaba	18,205
Mount Brown	16,000
Mount St Elias	13,500
South America.	
Aconcagua	22,427
Mercedario	22,302
Gualtieri	22,000
Huascan	22,000
Europe.	
Mont Blanc	15,732
Ben Nevis	4,406
Snowdon	3,571
Carran-Tual	3,414
Scaw Fell Pike	3,210

Mountmellick, a town in Queen's County, Ireland, on the Grand Canal, 7 miles N. of Maryborough by rail. It has a brewery, a tannery, and manufactures woollens and tobacco. Pop. 3126.

Mount Morgan, a gold-mining township in Queensland, 28 miles SSW. of Rockhampton. The gold-mine at the summit of the mount, said to be the richest deposit in Australia, was originally sold for £640 to a copartnery, including the brothers Morgan, and after changing hands several times became a limited liability company, with a capital of £1,000,000. The gold is described as of unusual fineness and purity. An estimate made in 1887 was to the effect that there were 1,000,000 tons of ore available, from which gold to the value of £20,000,000 was expected. The yield in 1887 was 83,705 ounces. Pop. (1890) about 2000.

Mount Vernon, memorable as the residence and the burial-place of General Washington, is on the right bank of the Potomac, in Virginia, 15 miles below Washington. In 1856 the mansion and surrounding property were saved from the auctioneer's hammer, and secured as a national possession by the Ladies' Mount Vernon Association, assisted principally by Edward Everett.—Mount Vernon has given its name to a number of places in the United States, the most important of which is a city, the capital of Knox county, Ohio, on the Vernon River, 44 miles by rail NNE. of Columbus. It contains many handsome residences, and the river affords ample water-power for a number of mills and manufactories of doors and sashes, furniture, machinery, &c. Pop. (1890) 6016.

Mourne Mountains. See DOWN.

Mousa. See BROCH.

Mouse (*Mus musculus*), a familiar rodent, representative of a large genus to which rats also belong. It is not necessary to describe the soft 'mouse-coloured' fur occasionally varying to white; the scaly tail so useful in climbing; the bright, conspicuous eyes; and the well-hidden cosy nest. Not less familiar is the way in which this tiny mammal has followed man everywhere over the earth; breeding all the year round, and bringing forth four or five young at a birth, its extraordinary fecundity sometimes causes a plague in a district (as in the wheat-fields of South Australia in 1890). It may be well, however, in the face of continually recurrent discussion, to note the power that at least some of the common mice have of making musical sounds, 'not squeaking, but singing, musically and rhythmically, in a high key, with a thin and wiry, but not displeasing quality—something like a weak-voiced canary bird.' Mice are occasionally cannibals, and have been known to eat painters' putty with red lead in it. Larger than the above is the beautiful Wood-mouse (*M. sylvaticus*), an abundant pest in the fields and gardens of Europe, notable for the stores of grain and other food which it accumulates among the grass or just under the surface of the ground. Smaller than either, and smallest of British mammals, is the Harvest-mouse (*M. minutus*), which makes a neat globular nest of woven leaves among the grasses and reeds. The white-footed mouse (*Hesperomys leucopus*), which is exceedingly common in N. America, has small cheek-pouches, structures best developed in the related family of Cricetinæ or hamsters. Corresponding to the European harvest-mice are the American species of Ochetodon, of which *O. humilis* measures only about 2 inches in length, not including the tail. Finally, the Water-mice (Hydromys) of Australia may be noted as remarkably divergent. The name is sometimes extended, as we have seen, to include the smaller species of other genera than Mus, rat being an equally wide title for the larger forms. But, while the wide application of the name is naturally justified, care must be taken to keep the shrews (Sorex) in their entirely distinct, though somewhat analogous, position among Insectivora. See RAT, SHREW, VOLE.

1, Harvest-mouse (*Mus minutus*); 2, Long-tailed Field-mouse (*Mus sylvaticus*).

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Mousquetaires, the mounted body-guard of the kings of France, all of noble birth, were organised by Louis XIII. in 1622. They rode gray horses, and were disbanded in 1815.

Mouth. See the articles dealing with Palate, Digestion, Teeth, Tongue, Cancrum Oris, Salivation, Scurvy, &c.

Movables. See HERITABLE AND MOVABLE.

Moville, a seaside resort in County Donegal, on Lough Foyle, 19 miles NNE. of Londonderry. It is a calling-station of the Transatlantic steam-packets of the Anchor line. Pop. 1129.

Moving Plant (*Desmodium gyrans*), a plant of the natural order Leguminosæ, sub-order Papilionaceæ, a native of India, remarkable, as are also some other species of the same genus, for the spontaneous movement of the leaves. See PLANTS (MOVEMENT OF).

Mowing-machine, a machine for mowing lawns and bowling-greens, instead of the scythe. The mowing-machine differs from the reaping-machine in principle, chiefly in having revolving instead of horizontal cutters. The first successful mowing-machines in use in Britain were those invented by Shanks of Arbroath and by Green of Leeds about 1850, whose improved machines are yet the best where the wear and tear are heavy. There are now many rivals to these, chiefly of American manufacture, which are preferable to them on the score of lightness of draught, and consequently ease and speed in the performance of the work.

Moxa is a peculiar form of counter-irritation which was early practised in the East, particularly by the Chinese and Japanese, from whom it was learned by the Portuguese. One or more small cones, formed of the downy covering of the leaves of *Artemisia Moxa* (as used by the Chinese), or of the pith of various plants (as of the common sunflower), or of linen steeped in nitre, are placed on the skin over the affected part, and the ends remote from the skin are ignited. The combustion gradually proceeds through the cone and forms a superficial eschar on the skin. The surrounding parts must be protected by a pad of wet rag, with a hole in it for the moxa. It is not much used in Europe in consequence of the somewhat severe pain attending it.

Mozambique, the collective name for the territories of Portugal on the east coast of Africa, extends from Cape Delgado to Delagoa Bay, a distance of 1300 miles. The northern boundary is the Rovuma, the southern (in part), the Maputa, and the western frontiers are formed by Lake Tanganyika, the river Ruo, the Zambesi up to Zumbo, Mashona and Matabele Lands (British South Africa Company's Territories), and the Transvaal. The principal rivers, besides those already mentioned, are the Limpopo and Sabi, towards the south. The coast belt is low and swampy; but the interior rises into well-wooded plateaus, which furnish valuable timber. The soil is naturally fertile, and yields, in addition to maize, rice, manioc, &c., an abundance of natural products, such as cotton, sesame, cocoa-nut, medicinal plants, and india-rubber, but very little is done to cultivate them, owing to lack of capital and of means of communication. The imports (cotton goods, beads, hardware, arms and gunpowder, coals, spirits, and provisions) average about £508,000 annually; the exports (ivory, ground nuts, india-rubber, wax, copal, and oil seeds) about £765,000. The shipping is mostly (seven-tenths) in the hands of British firms. Customs duties are exceptionally heavy; agriculture does not flourish; mining is little prosecuted, although the country is rich in minerals, in gold, silver, iron, coal, and copper; pearls abound on the reefs off the coast, but are not gathered to any extent; and there is annually a deficit equal to 43 per cent. of the expenditure—some £60,000, which is made good by the home country. The pop. of the province is estimated at one million. There is a railway (1887) of 52 miles from Delagoa Bay to the Transvaal frontier. Chief towns: Mozambique, Quilimane, and Lourenço Marques, for which see the separate articles. The Mozambique territories are administered by a governor-general, assisted by a governing and a provincial council, and are divided into nine districts, each under a district governor.

MOZAMBIQUE, the capital, stands on a small coral island lying close to the mainland, and has a fine government house, a cathedral, an arsenal, &c. A fort, built by Albuquerque in 1508, two years after he occupied the island for Portugal, still stands at the north end of the island. Pop. 7380, of whom 6800 are natives, 280 Banyans, and about 100 Europeans. The city was formerly a great place for the slave-trade, but seems now hardly able to hold its own against Quilimane and Lourenço Marques. Its total trade ranges annually between £250,000 and £320,000.

Mozambique Channel, between Madagascar and the east coast of Africa, is about 1000 miles in length and 400 in average breadth. At its northern extremity lie the Comoro Islands.

Mozarabes. See MORISCOS; and for Mozarabian Liturgy, see LITURGY.

Mozart, WOLFGANG AMADEUS CHRYSOSTOM, was the younger child of Leopold Mozart, Kapellmeister to the Archbishop of Salzburg, and was born in Salzburg on 27th January 1756. Numerous anecdotes are related of his childhood, illustrating an almost incredible precocity of genius, whose early promise, however, was amply fulfilled in his after-life. On his first professional tour through Europe when he was six years old, he was accompanied by his sister Marianne, and under their father's care the children visited Vienna, Paris, Belgium, and London. The greatest triumphs of Mozart were won in Bologna, then the musical centre of Italy. The Philharmonic Academy there suspended the rule by which no one under twenty was eligible for membership, in order to elect this young prodigy of barely fifteen. The wonderful power of his memory was illustrated by a famous feat performed in this Italian tour. The Easter music in the Sistine chapel was jealously kept from the eyes of outsiders, and no copy of it was permitted to be made. After one hearing, Mozart wrote from memory a full and minutely correct vocal score. During all the years of childhood and boyhood Mozart had been ever under the immediate care of his father, until his twenty-first year, when, stung by the indignities heaped upon him at the archiepiscopal court, he asked permission to leave it. In September 1777 he left Salzburg for Paris, with his mother as companion and adviser; and from this date began that struggle with the world in which he was to be so soon overthrown. In Mannheim, which he visited on the way, he made the acquaintance of a new instrument, the clarionette, which he was the first to incorporate in the modern orchestra, and fell in love with Aloysia Weber, the second daughter of a poor man with a considerable family. For many obvious reasons Leopold Mozart was greatly disturbed, and the correspondence between the anxious loving father and the disappointed but always dutiful son throws a flood of light on the relation, as beautiful as it is rare, in which they stood to each other.

In Paris mother and son had to practise the strictest economy, for the mature musician no

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longer commanded the limitless admiration and interest so readily accorded to the prodigy fifteen years before. In poor lodgings and amid depressing surroundings the mother's health gave way; she died in her son's arms; and Mozart returned to the paternal roof in Salzburg.

In 1781, having re-entered the service of the archbishop, he followed him with the rest of the prelate's household to Vienna. Although the archbishop was proud to have such a famous artist in his suite, he hated Mozart, and even the compliments so easily won on all hands by the young man were made so many occasions to wound his proud spirit. At last, stung by the studied and systematic insult to which he was subjected by his patron, Mozart retorted in language more caustic than prudent, which procured him an instant and ignominious dismissal.

Mozart took lodgings with his Mannheim friends, the Webers, who had now settled in Vienna. The father, his firm friend, was now dead, and Aloysia was married; but her place in Mozart's heart was taken by her younger sister Constance, a very gentle and attractive girl. Constance made a loving and devoted wife, but a wretched manager. She kept her husband up to his engagements, and amused him by her powers as a story-teller; but debts and difficulties increased. Just a month previous to his marriage he produced the charming little opera, *Die Entführung aus dem Serail*, which paved the way for the next, *The Marriage of Figaro*, the most delightful of lyric comedies. With his magic wand he touched the somewhat coarse or at least questionable elements in Beaumarchais' play, and these assumed an ideal form in a supernatural atmosphere of pretty piquancy where naughtiness is unknown. The opera was more than a success, it created a furore; yet jealousy and court intrigue prevented any reward, any acknowledgment that the greatest living musician was labouring and hungering in their midst. More generous appreciation was offered him in Prague, and, being commissioned to write an opera for the theatre there, he set to work on *Don Giovanni*. The summer-house and the little stone table on which most of the charming music was written are still shown in the gardens, where, amid the noise of conversation and skittles, he worked apparently undisturbed. The extraordinary success of *Don Giovanni* made it impossible for the court still to overlook the composer, and he was appointed 'Kammer-Musicus' to Joseph II., his duties being to supply dance-music for the imperial balls at a salary of £80 a year.

Pecuniary embarrassments pressed heavily on his heart once so light, and he writes of gloomy thoughts, which he has to repress with all his might. He had great hopes that a journey to Berlin, *viâ* Dresden and Leipzig, in company with his friend and pupil, Prince Lichnowski, might give some chance of bettering his condition; and indeed Frederick-William II. of Prussia was so delighted with him that he offered him the post of Kapellmeister with about £450 a year. But a sentimental loyalty prevented him from accepting it. Ever-increasing difficulties induced him to inform the emperor of the king of Prussia's offer, and when Joseph seemed painfully surprised, Mozart, confirmed in an unreasoning affection for a monarch who did so little for him, exclaimed: 'I throw myself upon your kindness and remain.' Joseph II. ordered a new opera, *Cosi fan Tutti*, but owing to his death, and the indifference to art of his successor Leopold II., the composer reaped no pecuniary benefit. He made one more desperate application for a regular post, and was rewarded by being appointed assistant and successor (without pay for the present) to the Cathedral Kapellmeister, who outlived him many years. His carelessness and improvidence beset him with endless petty embarrassments, and Constance's frequent illnesses, which necessitated prolonged visits to health-resorts, were an additional and serious drain on the precarious income. He was hastened towards financial ruin too by his heedless and overpowering generosity, often casting his pearls before swine—'false friends,' his sister-in-law terms them, 'secret blood-suckers and worthless people, intercourse with whom ruined his reputation.' In 1791, Mozart's health even then breaking down, an adventurer, a brother freemason, applied to him for help. This was Schikaneder, a theatre manager, who found himself in difficulties, from which he said only a new opera by Mozart could save him. He suggested the subject himself, *The Magic Flute*, and, seeing Mozart's failing health and uncertain powers of work, he took care to keep him under his own eye, giving him working accommodation in his own house, and keeping him in good humour with copious supplies of wine and frequent invitations to dinner. For a short time Mozart, harassed and ailing, sought to forget himself in a continual fever of excitement, and the lapses of these few sad weeks, multiplied and magnified, gave rise to the judgments which upon those who so hastily condemn reflect double the dishonour they would impute. As the struggle with the world became more unequal, as the iron entered deeper into his soul, his vision became clearer to read the mystery of life. In six weeks he wrote his three greatest symphonies, in which first throbs that intense expression of passion and 'Weltschmerz' which was to raise Beethoven, his stronger successor, to the highest place of honour in Music's temple.

In March 1791 he began the *Magic Flute*, which was produced on the 30th September; and, though it was at first coldly received, it rapidly conquered public opinion, and in the end made the fortune of the lucky Schikaneder. While he was at work on the opera Mozart received the famous visit about which so much mystery has been made. One night a stranger, now known to have been the steward of a nobleman, Count Walsegg, appeared and commissioned him to write a Requiem Mass to be finished in a month. He enjoined the strictest secrecy, and departed as mysteriously as he had come. The month passed, and Mozart was just stepping into the travelling-carriage which was to take him to Prague for the production of a new opera, when the stranger again appeared and reminded him of his promise. The incident made a deep impression on him; and the idea that it was a summons from the other world grew upon the fevered brain and broken heart of the composer. He was really dying, and, as he worked hard at the Requiem, he felt, as he said, that he was writing it for himself. On the 4th of December a few friends met in his room to rehearse the part of the work which was finished, but the dying composer was unequal to the effort. During the evening he seemed, even in unconsciousness, to be occupied with his work until at midnight came the last summons.

He was buried in the common ground of St Mark's Churchyard, and no friendly eye saw his remains laid in their last resting-place. When the bereaved wife made inquiries a few days afterwards, she found that the gravedigger had been changed, and her search for the grave proved fruitless; thus no one knows where Mozart was buried. It was many years after his death that Vienna awoke to sense of her shame and erected a beautiful monument to the memory of her adopted son.

Mozart wrote 624 compositions; he left no branch of the art unenriched by his genius; and he takes a

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high place in all. Indeed, in opera and symphony, in spite of the more advanced writings of Wagner and Beethoven, he may be said to be second to none. Gifted with an inexhaustible vein of the richest, purest melody, he is at once the glory and the reproach of the Italian school (see OPERA); for, while he surpasses all Italians on their own chosen ground, his strict training in the German school placed at his service those wonderful resources of harmony and instrumentation in which the southerners have always been deficient. His most important operas are those already mentioned, *Don Giovanni*, *The Magic Flute*, and *Figaro*. The first stands upon a pinnacle of its own in the history of opera. It has no rival, and commands the unlimited admiration of every true musician; the great deficiencies of the libretto are forgotten in the charm of the music, in the masterly combinations of effect shown in the finales and concerted pieces, and in the triumph of sustained dramatic power in the last scene. The greatest compliment that could be paid the *Magic Flute* is that it still holds its place as a classic on the opera-stage, in spite of the most incoherent and incomprehensible plot. The importance of the orchestration gives the work a place only second to *Don Giovanni*, and it has been a favourite study with all great opera-composers. *Figaro* is perhaps the most perfect opera of the three, for in it the plot is slight, and the time required for its development very short.

Of forty-one symphonies there are three which will occupy an honoured place so long as music exists. These are the C major (called the 'Jupiter'), G minor, and E♭. The first deserves its name from the proud and noble rhythm of the first part, and the absolute ease with which the last movement sets forth a triumph of the most complicated counterpoint. In the G minor beat the first distinct pulses of that great wave of romanticism and passion which was to flood with its influence all future musical development.

The E♭ is very lively and good-humoured and tender withal. It might almost be called a 'Carneval,' written before Schumann had shown the way to such titles. The quartets are very beautiful and exceedingly original; but they are not associated with Mozart's name as they are with that of Haydn, nor is the fame of the earlier creator overshadowed in this branch of the art as is the case in the realm of orchestral writing. His pianoforte sonatas, and those for the violin and piano, are of no great importance except in the development of musical form; but an exception must be made in the case of the *Fantasia in C minor*, which, like the G minor symphony, foreshadows much of the new school, and reaches even so far as the influence of Schubert. His Masses are all youthful works, with the faults of youth easily recognisable, and the marks of the haste with which they were supplied as occasion required. The *Ave Verum*, a late church composition, though simple, is very expressive and touching. The unfinished *Requiem* remains a noble monument of his genius.

The great authority on Mozart's life is Otto Jahn (1856–59; 2d ed. 1867; Eng. trans. by Townsend, 1882); see also the Life by Nohl (Eng. trans. by Lady Wallace, 1877), that by Meinardus (1882), and the English one by Holmes (1845; 2d ed. 1878). Nohl edited the Correspondence (2d ed. 1877). See also the Life by Fischer (1888) of Mozart's second son, Wolfgang Amadeus (1791–1844), who wrote a few compositions of slight importance.

Mozdok, a town of Russian Caucasus, on the Terek, 58 miles N. of Vladikavkaz, with three large annual fairs for horses, sheep, cattle, &c. It grows excellent melons and wine. Pop. 11,008.

Mozley, JAMES BOWLING, an able theological writer and High Church divine, was born in Lincolnshire in 1813. Educated at Oriel College, Oxford, he became a fellow of Magdalen, vicar of Old Shoreham, canon of Worcester, and in 1871 regius professor of Divinity at Oxford. His chief books are: *The Augustinian Doctrine of Predestination* (1855); *The Primitive Doctrine of Baptismal Regeneration* (1856); *Review of the Baptismal Controversy* (1863); his admirable Bampton Lectures on *Miracles* (1865); *Oxford University Sermons* (1876); *Ruling Ideas in Early Ages* (1877); *Theory of Development*, in answer to Newman (1878); *Essays, Historical and Theological* (2 vols. 1878), containing among other papers admirable essays on Laud and Luther, an over-eulogistic study of Strafford, and a still less successful depreciation of Cromwell and Dr Arnold; and *Sermons, Parochial and Occasional* (1879). Mozley had great intellectual force, subtlety of analysis, and imaginative versatility, but he wrote without facility, and his style is not commensurate in quality with his thought. He died 4th January 1878. See his *Letters* (1884).—His elder brother Thomas, rector of Plymtree, Devon, is well known as the author of *Reminiscences chiefly of Oriel College and the Oxford Movement* (1882), and *Reminiscences, chiefly of Towns, Villages, and Schools* (1885).

Mozuffernugger. See MUZAFFARNAGAR.

Msket, also written MTSCKETHA and otherwise, probably the most ancient town of the Caucasus, and down to the 5th century the capital of the old Georgian kings, stands on the south side of the Caucasus, 10 miles NNW. of Tiflis. It contains a cathedral, already existing in the 4th century, in which the Georgian kings were crowned and buried. When the Poti-Tiflis Railway was constructed, an ancient necropolis was laid bare; the graves were those of a cannibal race, and furnished proof that the modern Georgians are the direct descendants of the ancient Iberi.

Mtzensk, a town of Russia, 31 miles by rail NE. of Orel. Pop. 15,067.

Much Woolton (i.e. 'Great Woolton'), a town of Lancashire, 6 miles SE. of Liverpool. Near it are large quarries. Pop. 4541.

Mucilage is the term applied to the solution of a gum in water—thus, mucilage of acacia, mucilage of tragacanth. The term is also sometimes applied to the natural solution of gummy substances found in plants. See GUM.

Muckers, the popular name of a sect which sprung up at Königsberg in 1835. The movement seems to have originated in the dualistic and theosophic views of John Henry Schönherr (1771–1826) concerning the origination of the universe by the combination of a spiritual and a sensual principle. The most notable of his followers were two clergymen, J. W. Ebel (1784–1861) and Diestel, both of whom were in 1839–42 degraded from their office. Hepworth Dixon (in his *Spiritual Wives*, 1868) pointed out the resemblance of the Mucker sect to the Agapemone (q.v.) and the Perfectionists (q.v.). In 1874, at Porto Alegre in Brazil, a band of German Muckers, under a prophetess, were nearly all killed in conflicts with the military.

Mucous Membrane. Under the term mucous system anatomists include the skin, mucous membranes, and true glands, all of which are continuous with one another, and are essentially composed of similar parts (see SKIN, GLANDS). The mucous membrane is divided into the alimentary mucous membrane (for which see DIGESTION, Vol. III. p. 813), the respiratory (see NOSE, RESPIRATION), and the genito-urinary (see KIDNEYS, &c.).

Mudar (*Calotropis*), a genus of Asclepiadaceæ found in India, Persia, &c. The inspissated juice is used as a purgative and sudorific medicine.

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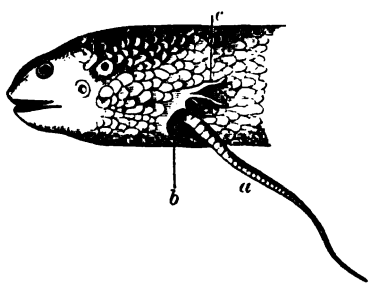
Mudejares. See MORISCOS.

Mud-fishes (*Dipnoi*), a small but very important order of fresh-water fishes, a connecting-link towards Amphibians. There are only two genera, widely separated in geographical distribution—Ceratodus from Queensland and Protopterus from tropical Africa. Of an alleged third genus, 'Lepidosiren' from Brazil, we know extremely little, not enough to warrant its separation from Protopterus. The wide range of distribution, and the discovery in Mesozoic rocks of fossil teeth resembling those of Ceratodus, confirm the impression of ancient origin which is suggested by not a few facts of Dipnoan anatomy, such as the persistent notochord without distinct vertebræ, the intestinal spiral valve, the cloaca, the abdominal pores, &c. (see FISHES). On the other hand the mud-fishes are in other respects almost amphibians, for the swim-bladder functions as a single (Ceratodus) or double (Protopterus) 'lung,' along with which gills also persist. The Dipnoi are thus important connecting-links. The limbs are peculiar in the possession of a central axis, which in Ceratodus bears rays on each side. The body is covered with flat scales, is from four to six feet in length, and bears a symmetrical tail. Ceratodus seems to feed on decaying leaves and the like, Protopterus on fish, frogs, insects, &c.,



Head of Protopterus (after Wiedersheim): Showing fore-limb (*a*), entrance to gill-cavity (*b*), external gills (*c*).

while 'Lepidosiren,' though described by the natives as feeding on roots, is said to have teeth suited to carnivorous diet. The nostrils open posteriorly into the mouth, a condition occurring in no other fish, unless Myxine be reckoned as such. Air is taken into the lungs at the surface of the water, and this mode of respiration becomes more emphatic when the fishes venture to wriggle ashore, as Ceratodus is said to do, or get into thick muddy water, or when the dry season begins to desiccate the pools. It is then in fact that Protopterus most deserves its popular name, descending into the mud, rounding off a nest for itself, and becoming more or less dormant. 'The mud around one of these nests becomes very hard, and the balls thus formed have been dug out, and, without breaking, have been brought to Europe or North America. A short immersion in water serves to release the fish, which will live for some time in confinement.' Both Ceratodus and Protopterus are esteemed as food. The development of all the forms is still quite unknown. The term 'mud-fish' is also applied to a Ganoid (*Amia calva*) not uncommon in some of the fresh waters of the United States. It attains a length of two feet, is carnivorous in diet, and gulps air at the surface of water, the air-bladder having truly pulmonary functions.

See CERATODUS, FISHES, LEPIDOSIREN; also Günther's *Study of Fishes* (Edin. 1880); Howard Ayers, *Jenaische Zeitschr. f. Naturwiss.* xviii. 1885, with literature.

Mudie, CHARLES EDWARD, founder of the celebrated library which bears his name, was born at Chelsea in 1818. Having started as a bookseller, he established his library in 1842, which became a limited company in 1864, and had 25,000 members in 1890, the annual receipts being £100,000. He published poetical *Stray Leaves* (1873), and died 28th Oct. 1890. See BOOK-TRADE.

Mudki, often spelt MOODKEE, a village of the Punjab, India, 26 miles S. of the Sutlej, and on the old road from Firozpur to Karnal. Here the first battle in the Sikh war of 1845–46 was fought (18th December 1845), when the British under Sir Hugh Gough repulsed the Sikhs, and Sir Robert Henry Sale, 'Fighting Bob,' was killed.

Mud Volcanoes. See VOLCANOES.

Muezzin (Arab. *Mu-zin* or *Mu-azzin*; sometimes *Mueddin*), the official attached to a Mohammedan mosque, who announces the different times of prayer. See MOHAMMED, p. 249.

Mufti. The Turkish Grand Mufti or Sheikh-ul-Islam is the head of the great corporation of Ulema (q.v.), the interpreters of the Koran, by whose decisions (when written down, *Fetwas*) the Cadis have to judge. The chief of the Ulema is little less powerful than the Grand Vizier.

Muggletonians, a sect that arose in England about the year 1651, and of which the founders were John Reeve and Lodowick Muggleton (1607–97), obscure men, but who claimed to have the spirit of prophecy. Muggleton was a journeyman tailor. He professed to be the 'mouth' of Reeve, as Aaron was of Moses. They affirmed themselves to be the *two witnesses* of Rev. xi. They asserted a right to curse all who opposed them, and did not hesitate to declare eternal damnation against their adversaries. They favoured the world with a number of publications, one of which—particularly directed to the Parliament and Commonwealth of England, and to his Excellency the Lord General Cromwell—was entitled a *Remonstrance from the Eternal God.* The prophets were at that time imprisoned as nuisances in Old Bridewell. Another publication was a *General Epistle from the Holy Spirit* in 1756; Muggleton's writings were collected again in 1832. He had assailed the Quakers, and was answered effectively by Penn and George Fox. He denied the doctrine of the Trinity, held anthropomorphist opinions, with many strange doctrines over and above, as that the devil became incarnate in Eve, &c. A few Muggletonians lingered in England well into the 19th century. See Jessopp's *Coming of the Friars, and other Essays* (1888).

Mugwumps, a title conferred, during the United States presidential election of 1884 (New York *Sun*, June 15), on such Republicans as threw over the nominee of their party for Cleveland, the Democratic candidate, in the interests of civil service reform. The title implied a belief that these Independents set themselves up as superior to their former associates.—The word means 'big chief' in the Algonquin Indian dialects, and John Eliot, who spelled it 'Mugquomp,' employed it to translate 'leader' and 'duke' (as in Gen. xxxvi. 15) in his Indian version of the Bible.

Mühlberg, a town of Prussian Saxony, on the Elbe, 36 miles SE. of Wittenberg. Pop. 3441. Here, on 24th April 1547, the Emperor Charles V. defeated John Frederick the Magnanimous, Elector of Saxony. See SCHMALKALD.

Mühlhausen, a town of Prussian Saxony, on the Unstrut, 25 miles by rail NNW. of Gotha. An important imperial free city in the 13th century, it came to Prussia in 1802, to Westphalia in 1807, and again to Prussia in 1815; and it is still an active centre of commerce, with manufactures of woollen and cotton goods, hosiery, &c. Pop. (1875)

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21,054; (1885) 25,141. See works by Herquet (1874), Pfaff (1874), and Stephan (1886).

Muir, JOHN, a distinguished Sanskrit scholar, was born in Glasgow in 1810, studied at the university there and at Haileybury, and at eighteen went out to Bengal to join the East India Company's Civil Service, in which he remained for twenty-five years. His last years were spent in Edinburgh, where he died, March 7, 1882. Muir was a munificent patron of learning, and himself a scholar of unusually wide intellectual and spiritual sympathies. He founded and endowed a chair of Sanskrit in Edinburgh, as well as prizes for high attainments in that language, and also provided the funds for a lectureship in comparative religion. His great work was his *Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions* (5 vols. 1858–70; 2d ed. 1868–73). Another book is *Metrical Translations from Sanskrit Writers* (1878).

SIR WILLIAM MUIR, his brother, was born in 1819, and at eighteen joined the Bengal Civil Service after having attended lectures at both the universities of Edinburgh and Glasgow. He rose rapidly in rank, was made K.C.S.I. in 1867, and was lieutenant-governor of the North-west Provinces, 1868–74, and Financial Minister to the government of India, 1874–76. After his return to England he sat on the Council of India, 1876–85, when he was elected Principal of the university of Edinburgh. Sir William Muir is an eminent Arabic scholar, and his *Life of Mahomet* (4 vols. 1858–61; abridged ed. 1877) and *Annals of the Early Caliphate* (1883) are works of solid and enduring value. Other books are *The Corân, its Composition and Teaching, and the Testimony it bears to the Holy Scriptures* (1878); *Extracts from the Corân* (1880); and *The Early Caliphate and Rise of Islam*, the Rede Lecture for 1881.

Muirkirk, a town of Ayrshire, 26 miles E. by N. of Ayr, bleakly situated, 720 feet above sea-level. It is the seat of great ironworks, dating from 1787. Pop. (1871) 2376; (1881) 3470.

Mukaddasi, an Arab geographer, born at Jerusalem, voyaged extensively for twenty years, and described Moslem lands in a work published in 985 A.D. It was edited by De Goeje in 1877; and the part relating to Syria and Palestine was translated from the Arabic for the Palestine Pilgrim's Text Society in 1887, by Guy Le Strange.

Mukden, or MOUKDEN, capital of Manchuria, is situated in the southern part of the country, on a branch of the river Liao, 425 miles NE. of Peking. Mukden is the Manchu name; the Chinese call it Shingking, its present official title. The town is surrounded by a good masonry wall, a parallelogram in shape. Outside this the suburbs extend for one to two miles and are protected by a mud wall. The imperial palace stands in the centre of the city, enclosed within a third separate wall. Previous to 1625 the town was called Shenyang; in that year Nurhachu, the founder of the present reigning family in China, made it his capital and called it Mukden. The Irish and Scotch Presbyterians are very active in the place; they conduct also a medical mission which is very successful. There is, too, a Roman Catholic mission. Numerous temples adorn the city. About four miles to the east is the tomb of Nurhachu. Mukden contains other imperial tombs of the reigning family. Good coal exists in the vicinity. Its port is Newchwang (q.v.), a railway between the two places being in contemplation in 1891. Pop. (1887) 250,000.

Mulatto. See NEGRO.

Mulberry (*Morus*), a genus of trees of the natural order Moraceæ, natives of temperate and warm climates, with deciduous leaves, unisexual flowers in short, thick spikes, a 4-parted perianth, containing either four stamens or one pistil with two styles, the perianth of the female flowers becoming succulent and closing over the small pericarp, the whole spike coalescing into an aggregate fruit.—The Common Mulberry, or Black Mulberry (*M. nigra*), is a native of the middle parts of Asia, but was introduced into the south of Europe more than a thousand years ago, and is now almost naturalised there. It is a low tree, much branched, with thick rough bark, and broad heart-shaped leaves, which are unequally serrated, and very rough. It is cultivated in the middle parts of Europe, and succeeds well in the south of

Common Mulberry (*Morus nigra*).

England, but in the northern parts of Britain it requires a wall. The perianth and stigmas are roughly ciliated, and the fruit is of a purplish-black colour, with dark red juice, fine aromatic flavour, and subacid sweet taste. The fruit is much esteemed for dessert; an excellent preserve and a pleasant light wine are made of it. The tree often produces its fruit in prodigious quantity. The wood is employed in cabinet-work, but is not of much value. The leaves are sometimes used for feeding silkworms. The Black Mulberry lives long; trees still existing in England are known to be more than 300 years old. It is propagated by seed, by suckers, by layers, or by cuttings. It succeeds best in a rich light soil.—The White Mulberry (*M. alba*) is a native of China, and has been there planted from time immemorial for the sake of its leaves, which are the best food for silkworms; on this account also it has been cultivated in the south of Europe since about 1540. In North America it does not succeed farther north than 43° lat., being somewhat more impatient of frost than the Black Mulberry. The perianth and stigmas are smooth; the fruit is almost white, and is much less palatable than that of the Black Mulberry, although in this respect there is great difference among the many varieties. A rob made of it is useful in sore throat. The best variety for feeding silkworms, on account of its rapid growth and abundant leaves, is that called the Philippine Mulberry. In India the White Mulberry is treated as a bush, and cut down twice a year; the shoots, stripped of their leaves, being thrown away, although the bark has long been used in China and Japan for making paper. It grows readily from cuttings. The root has a considerable reputation as a vermifuge.—The Red Mulberry (*M. rubra*), a native of North America, abounding

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particularly on the lower parts of the Missouri, endures severe frosts much better than either of the preceding, and is therefore preferred for cultivation in some parts of Europe. Its fruit is deep red, and almost as pleasant as the Black Mulberry. It forms a tree 60 to 70 feet high, with a circumference of about six feet; the wood is fine grained, strong, and adapted even for shipbuilding, but cannot be procured in any quantity for that purpose.—The Indian Mulberry (*M. Indica*) has black fruit of a delicate flavour, and the leaves are extensively used for feeding silkworms in China, Cochin-China, and Bengal.—*M. atro-purpurea* has been introduced into India from China for feeding silk-worms. *M. Mauritiana*, a native of Madagascar and Mauritius; *M. celtidifolia* and *M. corylifolia*, Peruvian species; *M. Tatarica*, a native of central Asia; *M. lævigata*, the species most common in the north of India; and *M. Cashmeriana*, a native of Cashmere, produce pleasant fruit. *M. dulcis*, a native of the north of India, is said to be superior in flavour to all others.

The Paper Mulberry (*Broussonetia papyrifera*) differs from the true mulberries in having the female flowers collected in a globular mass. The tree is of moderate size, or, in cultivation, a bush of 6 to 12 feet high, with leaves either simple or lobed, a native of India, Japan, and the islands of the Pacific Ocean, but now not uncommon in pleasure-grounds in Europe and North America. The islanders of the Pacific cultivate the Paper Mulberry with great care. They make a kind of clothing from the bark, using for this purpose the bark of small branches about an inch in diameter, which they macerate in water, and then, scraping off the epidermis, they press and beat the moist slips together. The paper also which is used in Japan and many parts of the East is in great part made from the bark of the young shoots of this plant, which for this purpose is boiled to a pulp, and treated somewhat in the same way as the pulp of rags in Europe. When the shoots are cut, new ones spring up very rapidly. Silkworms eat the leaves of the Paper Mulberry. The fruit is oblong, of a dark-scarlet colour, sweetish, but insipid.

Mulcaster, RICHARD, philologist (died 1611), was a scholar of King's College, Cambridge, in 1548, but attracted no notice till 1555, when he removed to Oxford, and was chosen student of Christ Church, quickly becoming eminent for his knowledge of eastern literature. In 1561 he was appointed master of Merchant Taylors' School, and in 1596 master of St Paul's School. He enjoyed great reputation as a Greek and oriental scholar and successful schoolmaster. His English and Latin works were celebrated in their day, the principal being *Positions, &c. necessarie for the Training up of Children* (Lond. 1581) and *Elementarie on the Right Writing of our English Tung* (1582). He was early addicted to dramatic composition, and assisted in the performance of plays before Queen Elizabeth.

Mulder, GERARD JOHANNES (1802–80), was professor of Chemistry at Utrecht, and was best known from his investigations on protein and vegetable physiology.

Mule, the hybrid offspring of the male ass and the mare, much used and valued in many parts of the world as a beast of burden. The head, ears, croup, and tail show very distinctly the 'prepotency' of the ass; but in bulk and stature the mule is nearer the horse, and seems to excel both its parents in sagacity, muscular endurance, surefootedness, and length of life. Though never much used in Britain (save in some places for tram-cars), it has been common from ancient times in many parts of the East, and is a very important animal in most of the countries round the Mediterranean, and in the mountainous parts of South America. The best European breeds are found in France, Spain, and Italy; those of Kentucky, Missouri, Minnesota, and Mexico are also renowned. The carrier-mules of South America and elsewhere are driven in troops, each led by a bell-bearing old mare. Her they follow with such docility and affection that when the troops mingle in their halting-places they are readily separated by securing the leader. In ancient times mules were often reserved as the peculiar steeds of princes, and they are still used to draw the carriages of Italian cardinals and other ecclesiastical dignitaries. Mules are very surefooted, strong of limb and firm of hoof, clever at passing steep places and sharp turns, easy to please with food. They may be ridden, driven, or used for pack purposes. Their flesh is edible.

The fact that mules are generally sterile has given rise to the common mistake of supposing that sterility is a necessary consequence of hybridisation. Even as regards mules, the females may be successfully crossed by horse or ass, though the more numerous males seem to be constantly sterile. The hinny or companion hybrid of the mule, the offspring of a female ass and a stallion, is not common, and is decidedly inferior in size, strength, and beauty. See ASS, HORSE, HYBRID, CANARY; and for the Spinning-mule, see SPINNING.

Mulgrave Islands, a name given to some of the Marshall Islands (q.v.) from their discoverer, the navigator Lord Mulgrave (1744–92).

Mülhausen (Fr. *Mulhouse*), a town of Alsace-Lorraine, on the Ill and the Rhone and Rhine Canal, 68 miles by rail SSW. of Strasburg and 20 NW. of Basel. It consists of three parts, the old town, the new town, and the artisans' town, and is a place of first-rate industrial importance. The cotton manufacture employs 16,000 workpeople in the town and 60,000 in the adjacent villages. Besides this, it has printing and dye works for cotton, linen, calico, wool, and silk fabrics, chemical factories, iron and other metal works, and shops for making machinery, railway plant, &c. Pop. (1821) 13,027; (1861) 45,887; (1885) 69,759; (1890) 76,413. Mülhausen, which existed as early as 717, was made a free imperial city by Rudolf of Hapsburg in 1273. By siding with some of the Swiss cantons in the 14th century, it was enabled to maintain a certain degree of neutrality in the feuds between the empire and France. In 1515 it joined the Swiss Confederation, and in 1528 adopted the Reformed faith. But in 1798 it was incorporated with France, and began to come to the front as an industrial place after 1829. It is noted for the excellent arrangements made for the housing, &c. of the working-classes. It became a town of the German empire after the war of 1870–71. See Histories of the town by De Sablière (1856) and Metzger (Lyons, 1883).

Mülheim, a manufacturing town of Rhenish Prussia, on the river Ruhr, 16 miles N. of Düsseldorf. It has great ironworks and an extensive trade in coal. Pop. (1875) 15,445; (1890) 27,702.—MÜLHEIM-AM RHEIN, 3 miles above Cologne, carries on extensive manufactures of silk, velvet, thread, leather, &c. Pop. (1875) 17,350; (1885) 24,975.

Mull, an Argyllshire island, the largest of the Hebrides after Lewis and Skye, is separated from the mainland by the Sound of Mull (19 miles long and 1½ to 3¼ miles wide), and is engirt by a number of smaller islands—Gometra, Ulva, Staffa, Iona, &c. It is 347 sq. m. in area, and has a maximum length and breadth of 30 and 29 miles, but is so deeply indented, especially towards the

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Atlantic, by a dozen sea-lochs and bays—the chief, Loch-na-Keal and Loch Scridain—that the coast-line cannot be less than 300 miles. The rocks are chiefly volcanic, with a quarry of fine red granite in the south-west; and the surface is mountainous. Benmore (3185 feet) is the loftiest summit, Bentalloch the most beautiful, where there is much that is beautiful—these misty heights, the stretching moors, the sea-cliffs at Carsaig, the terraced basaltic plateaus, the glens, streams, and lakes, and the patches of wood and green pasture. The climate is good for the Highlands, and the soil of fair fertility, but grazing answers much better than corn-crops. Tobermory, in the north, 28 miles WNW. of Oban, is the only town. It was founded in 1788 at the head of its sheltered harbour, and has a pier (1864), a telegraph, a new water-supply (1882), and 1200 inhabitants. Aros and Duart Castles are interesting ruins; and Mackinnon's Cave was pronounced by Dr Johnson 'the greatest natural curiosity he had ever seen.' Pop. (1851) 7485; (1881) 5229, of whom 4591 were Gaelic-speaking. See GALLOWAY (MULL OF), KINTYRE.

Mullein, the common English name of the genus Verbascum, belonging to the Scrophulariæ, and containing some eighty species, of which some six (Great Mullein, White, Dark, Moth, &c.) are natives of England, and have been naturalised in the United States. The leaves and stem (2 to 4 feet high), of the common and larger species, are covered with a dense, woolly growth; the flowers form a dense spike a foot long. A mucilaginous decoction of the leaves is used to allay coughs and as an emollient application.

Müller, F. MAX-. See MAX-MÜLLER.

Müller, GEORGE, founder of the Orphan Homes, Ashleydown, Bristol, was born near Halberstadt, Prussia, September 27, 1805. While in training for the ministry he was dissipated in his habits, and at sixteen he was sent to prison for defrauding an hotelkeeper. He went to Halle as a student of divinity, and a visit to a private meeting for praise and prayer proved the turning-point in his career, and in 1826 he began to preach and teach, and took up his abode in free lodgings provided for poor divinity students. Through Tholuck's advice he came to London in 1829, and studied Hebrew and Chaldee with the view of becoming a missionary to the Jews. He settled at Teignmouth as minister of Ebenezer Chapel, and in the conduct of his church abolished collections and depended on voluntary gifts. In 1835 he printed proposals for the establishment of an Orphan House, which took shape in 1836 at Bristol. As the result only of 'prayer to God' he announced that he had received £84,441 up to 1856 on behalf of the orphans, who then numbered 297. By 1875 upwards of 2000 children were lodged, fed, and educated. In 1889 it was announced that the Orphan Homes and associated enterprises cost about £36,000, which sum was the result of faith and prayer and voluntary subscriptions on the part of the public. Müller visited the East on an evangelistic tour in 1889. He has published *A Narrative of some of the Lord's Dealings with George Müller* (1837). Other three portions were published, 1841–56.

Müller, JOHANNES, one of the most eminent physiologists of the 19th century, was born at Coblenz on 14th July 1801, studied at Bonn and Berlin, chiefly anatomy and zoology, and in 1826 was appointed professor of Physiology and Anatomy at Bonn; in 1833 he succeeded Rudolphi as professor of Anatomy and Physiology at Berlin, and held that post until his death, 28th April 1858. He is regarded as the founder of modern physiology, on the ground that he summed up the work of his predecessors, instituted the methods of experimental and microscopic investigation of physiological properties, himself carried out and recorded most valuable observations in connection with the mechanism of sight, hearing, and voice, and the chemical and physical properties of chyle, lymph, and bile, and studied in an original and fruitful way the phenomena of reflex action and the glands. Moreover, his *Handbuch der Physiologie des Menschen* (2 vols. 1833–40; Eng. trans. 1840–49) exercised a great influence as a text-book of the science, and Müller counted amongst his pupils several men who now stand in the front rank of German science, such as Helmholtz, Vierordt, Du Bois Reymond, &c. Müller was scarcely less eminent as a student of comparative anatomy; he observed rapidly and accurately, and possessed a remarkable insight into the interrelations of structural parts. In this department of work his most famous memoirs were those on the Amphioxus, on Fishes, the Echinoderms, and the Cæcilians. Several of his works were translated into English between 1839 and 1849.

Müller, JOHANNES VON, historian of Switzerland, was born 3d January 1752, at Schaffhausen, studied at Göttingen under Heyne, Schlözer, and others, and in 1772 was appointed professor of Greek at Schaffhausen. Already he had commenced the investigation of Swiss chronicles and documents. From 1774 to 1780 he lived in Geneva, taught there, and wrote his *Allgemeine Geschichte* (3 vols. 1810), and published the first volume of his great work, *Geschichte der Schweizer*. Shortly afterwards he was given the professorship of History and a librarianship at Cassel, but resigned both posts in 1783. In 1786 he became librarian and councillor of state to the Elector of Mainz, and began the publication of his larger *Geschichte der schweizerischen Eidgenossenschaft* (5 vols. 1786–1808; improved ed. 1826). In support of the confederation of the German princes he wrote a *Darstellung des Fürstenbundes* (1787). In 1792, when Mainz was taken by the French, he went to Vienna, where the Emperor Leopold nominated him a member of the privy-council; but, a Protestant at a Roman Catholic court, he did not see much prospect of advancement, and in 1804 left Vienna for Berlin, where he was appointed historiographer of the Hohenzollern family, and wrote *Ueber die Geschichte Friedrich's I.*, *Ueber den Untergang der Freiheit der Alten Völker*, and *Versuch über die Zeitrechnungen der Vorwelt.* Introduced to Napoleon after the battle of Jena, he was appointed by him (1807) secretary of state in the new kingdom of Westphalia; but died at Cassel, 29th May 1809. His *Sämmtliche Werke* were published, 27 vols. Tübingen, 1800–17; new ed. 40 vols. Stuttgart, 1831–35. See Lives by Heeren (1820), Döring (1835), Monnard, in French (1839), and Thiersch (1881).

Müller, JULIUS, a German theologian, was born at Brieg, April 10, 1801, brother of Karl Otfried Müller, the antiquary. He studied at Breslau and Göttingen, at first law, next theology, and after a severe mental struggle adopted opinions in religion opposed to those of the Rationalists. In 1825 he was appointed pastor at Schönbrunn, south of Breslau, in 1831 second university preacher in Göttingen, in 1834 extra-ordinary professor of Theology there, next year ordinary professor in Marburg, and in 1839 in Halle. Here he died, 27th September 1878. His reputation as a theologian chiefly rests upon his great work on sin, *Die Christliche Lehre von der Sünde* (Bresl. 1839; 6th ed. 1878). It was translated into English by W. Urwick (2 vols. 1868). Another work was *Dogmatische Abhandlungen* (1870). Müller, together with Neander and Nitzsch, edited from 1850 to

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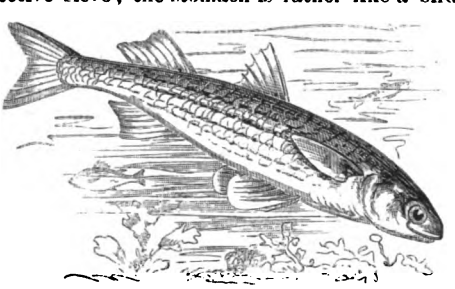
1861 the *Deutsche Zeitschrift für Christliche Wissenschaft und Christliches Leben*. There is a Life by Kähler (1878) and a study by Schultze (1879).

Müller, KARL OTFRIED, classical archæologist, was born 28th August 1797, at Brieg, in Silesia, studied at Breslau and Berlin, and in 1819 was appointed professor of Archæology and director of the Philological Seminary at Göttingen. He died at Athens, 1st August 1840, whilst on a tour through Italy and Greece. His great design was to embrace the whole life of ancient Greece, its art, politics, industry, religion, in one warm and vivid conception—in a word, to cover the skeletons of antiquity with flesh, and to make the dry bones live. Thus his activity ranged over the whole field of Greek antiquity. We are indebted to him for many new and striking elucidations of the geography and topography, literature, grammar, mythology, manners and customs of the ancients. His work on the Dorians (*Die Dorier;* Eng. trans. 1839) forms the 2d vol. of his *Geschichte Hellenischer Stämme und Städte* (new and improved ed. 1844), his principal production; the first vol. deals with Orchomenos and the Minyans. The treatises on the ancient Macedonians (1825) and on the Etruscans (2 vols. 1828; new ed. 1877–78) continue the same line of investigations. Other valuable works from his pen are *Ancient Art* (1830; new ed. 1878; Eng. trans. 1847); *System of Mythology* (1825; Eng. trans. 1844); and *History of the Literature of Ancient Greece* (1846), undertaken at the request of the British 'Society for the Diffusion of Useful Knowledge,' translated into English by Sir George Cornewall Lewis and Dr Donaldson, the latter of whom continued the work down to the taking of Constantinople. The German original was published by Müller's brother (2 vols. 1841; new ed. 1882–84). Müller issued useful critical editions of Varro, *De Linguâ Latinâ* (1833); Festus, *De Significatione Verborum* (1839); and Æschylus, *Eumenides* (1833–35). See Memoirs by Lücke (1841) and F. Ranke (1870).

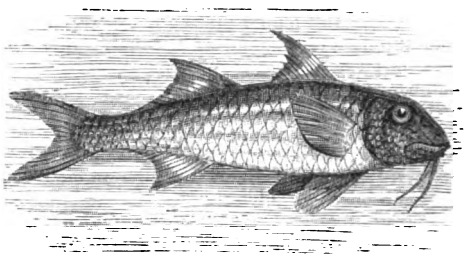
Mullet (*Mugil*), a genus of acanthopterous bony fishes, type of the family Mugilidæ. The members are common coast fishes, often frequenting brackish water. They eat mud, which they crush and sift within a filtering pharynx, rejecting the useless stuff, swallowing the rest for the sake of the organic debris it contains. The mouth has at most feeble teeth; the gill-rakers form an effective sieve; the stomach is rather like a bird's



Common Gray Mullet (*Mugil capito*).

gizzard; the intestines are exceedingly long. There are about seventy species, some of which attain a weight of 10 or 12 pounds. As they are edible and sometimes highly esteemed, the mullets ought to be more cultivated. Among British species *M. octo-radiatus*, *M. capito*, *M. auratus* may be noted. A species from the fresh waters of Central America (*M. proboscideus*) has a pointed fleshy snout. The Mediterranean mullet formed a favourite Roman dish, and their roes preserved are made into a delicacy.

The so-called 'red mullets' (*Mullus*) are quite different from the above, and not far removed from perches. The body is slightly compressed, and covered with large, thin scales. There are two long, erectile barbels and feeble teeth. About forty species, mostly from tropical seas, are divided among a number of sub-genera. There is only one European species (*M. barbatus*), of which the so-called 'surmullet' is probably the female form. It occurs on the southern coasts of Britain, and is much esteemed as a delicacy. The male seems to be smaller than the female, which in British waters rarely exceeds two pounds in weight. The colour



Surmullet.

of the surmullet is pale pink, with three or four yellow longitudinal stripes; but where any of the scales have been rubbed off beautiful tints of purple and bright red appear. This takes place also during the struggles of the fish when dying, and the Romans were therefore accustomed to bring surmullets alive into their banqueting-rooms that the guests might see them die, and enjoy the brilliant display of colour before eating the fish. 'The fishermen of our times,' Günther says, 'attain the same object by scaling the fish immediately after its capture, thus causing a permanent contraction of the chromatophores (colour-cells) containing the red pigment.' See Günther's *Study of Fishes* (Edin. 1880).

Mullet. See HERALDRY.

Mullingar', the chief town of Westmeath, in Ireland, 50 miles WNW. of Dublin by rail, on the Royal Canal and the river Brosna. It is an important trading town, has large infantry barracks, and is a centre for anglers visiting the Westmeath lakes. Pop. (1861) 5426; (1881) 4787.

Mullion, the upright division between the lights of windows, screens, &c. in Gothic architecture. Mullions are rarely met with in Norman architecture, but they become more frequent in the Early English style, and in the Decorated and Perpendicular are very common. They have sometimes small shafts attached to them, which carry the tracery of the upper part of the windows. In late domestic architecture they are usually plain. See WINDOW.

Mulock, MISS. See CRAIK.

Mulready, WILLIAM, genre-painter, was born at Ennis, in Ireland, 1st April 1786. When a boy he went to London with his parents, and at the age of fifteen entered as a student in the Royal Academy. Having tried classical subjects and landscape, he soon found his true sphere in genre-painting—painting subjects such as 'A Roadside Inn,' 'Horses Baiting,' the 'Barber's Shop,' and 'Punch' (1812), 'Boys Fishing' (1813), 'Idle Boys' (1815). He was elected an Associate of the Royal Academy in November 1815, and an Academician in February 1816. He also worked indefatigably at portrait-painting and the illustration of children's books; designed the famous

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'Mulready envelope' for Sir Rowland Hill; and was throughout conscientious, careful in drawing, and rich in colouring. 'The Truant' (1835), 'The Seven Ages' (1838), 'The Sonnet' (1839), 'First Love' (1840) are famous works of his middle period; and his illustrations to the *Vicar of Wakefield* are well known. His later works, 'Women Bathing' (1849), 'Blackheath Park' (1849), 'The Toy Seller' (1862), showed failing powers. He died in London, 7th July 1863. See Stephens, *Memorials of Mulready* ('Great Artists' series, 1890).

Multan, or MOOLTAN, an ancient city of India, in the Punjab, stands on a mound formed by the ruins of ancient cities that occupied the same site, 4 miles from the left bank of the Chenab, the inundations of which sometimes reach Multan. It is surrounded on all sides except the south by a wall 10 to 20 feet high. The European quarter lies to the north and west of the city, whilst to the south is the citadel, which contains two Mohammedan shrines, the ruins of an ancient Hindu temple, and a massive obelisk (70 feet) to the memory of Vans Agnew and Anderson, murdered here in 1848. The vicinity abounds in mosques, tombs, shrines, &c. Manufactures of silks, cottons, and carpets are carried on; and the glazed pottery and enamel work enjoy a high reputation. Multan is an important centre of trade: it collects all the products of the Punjab, chiefly cotton, wheat, wool, sugar, indigo, and oil-seeds, sends them by the Indus Valley Railway to Hyderabad and Karachi, and imports European piece-goods and other manufactured articles. From Afghanistan it receives fruits, drugs, spices, and raw silk, and sends back indigo, cotton, and other textiles, sugar, and coarse shoes (of its own manufacture). In 1849 Multan was taken by the British troops and annexed. Pop. (1868) 54,652; (1881) 68,674.—The area of the *division* is 20,295 sq. m., and its pop. (1881) 1,712,394; the area of the *district*, 5880 sq. m., and pop. (1881) 551,964.

Multiple-poinding is a well-known form of legal process in Scotland, by which competing claims to one and the same fund are set at rest. A person who has funds in his possession, to which there are more claimants than one, is liable to be harassed by double distress; and hence he commences a suit called the action of multiple-poinding, by which he alleges that he ought not to be made to pay the sum more than once; and as he does not know who is really entitled to payment, he cites all the parties claiming it, that they may fight out their claims among themselves. The corresponding process in England is Interpleader (q.v.).

Multiple Proportions. See CHEMISTRY.

Mum, a peculiar kind of beer made of wheat-malt, to which some brewers add oat and bean meal. See *Notes and Queries* for November 1881, p. 376.

Mummius. See CORINTH.

Mummy. See EMBALMING.

Mumps, a popular name of a specific inflammation of the salivary glands described by nosologists as *Cynanche Parotidæa*, or *Parotitis*. In Scotland it is frequently termed *The Branks*. The disorder usually begins with a feeling of stiffness about the jaws, which is followed by pains, heat, and swelling beneath the ear. The swelling begins in the parotid, but the other Salivary Glands (q.v.) usually soon become implicated, so that the swelling extends along the neck towards the chin, thus giving the patient a deformed and somewhat grotesque appearance. One or both sides may be affected, and in general the disease appears first on one side and then on the other. There is seldom much fever. The inflammation is usually at its highest point in three or four days, after which it begins to decline, suppuration of the glands scarcely ever occurring. In most cases no treatment further than antiphlogistic regimen, due attention to the bowels, and protection of the parts from cold, by the application of flannel or cotton-wool is required, and the patient completely recovers in a week or a fortnight. The disease is infectious; and the infection probably remains for at least a fortnight after apparent recovery. Like most infectious diseases, it seldom affects the same person twice. It chiefly attacks children and young persons. A singular circumstance connected with the disease is that in many cases the subsidence of the swelling is immediately followed by swelling and pain in the *testes* in the male sex, and in the *mammæ* in the female. The inflammation in these glands is seldom very painful or long continued, but is apt in the male to lead to permanent atrophy of the organ.

München. See MUNICH.

Münchhausen, KARL FRIEDRICH HIERONYMUS, BARON VON, a member of an ancient, noble family of Hanover, whose name has become proverbial as the narrator of false and ridiculously exaggerated exploits and adventures, was born 11th May 1720, at Bodenwerder, in Hanover, served as a cavalry officer in Russian campaigns against the Turks, and died at his birthplace, 22d February 1797. A collection of his marvellous stories, or stories attributed to him, was first published in English under the title of *Baron Münchhausen's Narrative of his Marvellous Travels and Campaigns in Russia* (Lond. 1785). The compiler was Rudolf Erich Raspe, an expatriated countryman of the baron's. The book went rapidly through several editions; and in 1786 appeared the first German version, edited by the poet Bürger. Ellisen's edition, *Des Freiherrn von Münchhausen wunderbare Reisen und Abenteuer* (11th ed. 1873), is enriched by an admirable introduction on the origin and sources of the book, and on the kind of literary fiction to which it belongs. Several of the adventures ascribed to the baron occur in Bebel's *Facetiæ* (1508); others in Lange's *Deliciæ Academicæ* (1765). See Müller-Fraureuth, *Deutsche Lügendichtungen* (1881).—A Freiherr von Münchhausen (1813–86) became in 1850 head of the government of Hanover; and after the annexation of Hanover by Prussia (1866) he made himself a champion of the national party.

Muncie, capital of Delaware county, Indiana, 54 miles by rail ENE. of Indianapolis, is an important railway junction, and has manufactories of furniture, castings, &c. Pop. 5219.

Münden, a town of Hanover, at the influx of the Werra and Fulda to the Weser, 15 miles NE. of Cassel. Engirt by wooded hills, it has a school of forestry (1868), an old castle, and manufactures of india-rubber, glass, sugar, &c. Pop. (1875) 5679; (1885) 7053. See also MINDEN.

Mungo, ST. See KENTIGERN.

Mungoose. See ICHNEUMON.

Munich (Ger. *München*), the capital of Bavaria, is situated in a flat, barren plain, 1700 feet above the sea-level, chiefly on the left or west bank of the impetuous Isar, a tributary of the Danube. By rail it is 440 miles SSW. of Berlin, 272 W. of Vienna, and 867 SE. of London. Seven bridges, including a railway bridge, span the river to the suburbs on the right bank. The elevated site of the city and the neighbourhood of the Alps render it liable to sudden changes of temperature, sometimes ranging over 20° in twenty-four hours. The population in 1885 was 261,981, of whom about 84 per cent. were Roman Catholics; by 1890 it had increased to 334,710; in 1880 it was 230,023;

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in 1801 only 48,885. Munich is one of the handsomest cities in Germany, and perhaps the richest in treasures of art, while itself famous for its school of painting. Within the last two generations, and especially under King Ludwig I. (1825–48), who spent nearly 7,000,000 thalers in beautifying the city, it has been decorated with buildings of almost every style of architecture, many of them ornamented with frescoes and sculpture; wide and handsome streets have been constructed; and the squares and gardens adorned with statues and other monuments. Among the imposing edifices raised for the accommodation of the public collections are the Glyptothek (1816–30), with its magnificent collection of ancient and modern sculpture, including the famous Æginetan marbles, discovered in 1811; the Old Pinakothek (1826–36), containing paintings by the old masters, besides 168,000 engravings and 22,000 drawings, and a priceless collection of 1500 antique vases; the New Pinakothek (1846–53), devoted to the works of modern painters; the Royal and National Library, with over 1,000,000 volumes and 30,000 MSS.; and the Bavarian National Museum, illustrating the history of civilisation and art. The New Palace includes an older palace and chapel, the Königsbau (1826–35), in the style of the Pitti Palace at Florence, with Schnorr's frescoes of the Nibelungenlied, and the sumptuously-adorned Banqueting Hall building. Other public structures are the Court Theatre, one of the largest in Germany, with room for 2600 spectators; the old and the new town-house; the Temple of Fame, a Doric colonnaded building containing busts of eighty illustrious Bavarians, in front of which rises the colossal statue of Bavaria, 65 feet high; the Generals' Portico (1844), a copy of the Loggia dei Lanzi at Florence; the conspicuous Maximilianeum, on its terrace on the right bank of the Isar, a college for civil servants, containing a gallery of modern historical paintings; and various palaces and administrative buildings. Among the gates of Munich the most beautiful are the Gate of Victory, designed after Constantine's triumphal arch in the Forum; the old Isar gate, with its elaborate frescoes; and the Propylæa (1862), commemorating the Greek war of independence. The numerous churches are all, except two or three, Roman Catholic. The oldest is St Peter's (1294). The huge brick church of Our Lady (1468–88), the cathedral of the archbishopric of Munich-Freising, is remarkable for its two unfinished towers (325 feet), now capped with cupolas; in the interior is the elaborate tomb of the Emperor Louis the Bavarian. St Michael's, or the Jesuits' church (1583–91), contains a monument by Thorwaldsen to Eugène Beauharnais; the Theatine Church (1767) contains the royal burial-vault; the Louis Church (1830–44) is embellished with Cornelius's fresco of the 'Last Judgment;' the beautiful church of St Mariahilf (1831–39) is noted for its gorgeous painted glass and fine wood-carvings; and the basilica of St Boniface (1835–50) for its sixty-six monoliths of gray Tyrolean marble and resplendent interior decoration. The Court Chapel of All Saints is a perfect casket of art-treasures. Munich is admirably endowed with scholastic, literary, scientific, and benevolent institutions, including Royal Academies of Art and Science, a Polytechnic School, &c. The university, removed from Landshut to Munich in 1826, has 171 professors and teachers, and over 3000 students; its library contains over 300,000 volumes; and its subsidiary institutions are numerous and well equipped. Adjoining the palace is the Court Garden, bounded on two sides by arcades adorned with frescoes; farther north is the English Garden, a park 600 acres in area; and on the right bank of the Isar are the attractive Gasteig promenades.

The industrial development of Munich lags behind its æsthetic development. Its stained-glass works, iron, brass, and bell foundries, lithographing and engraving works, and manufactories of optical and mathematical instruments, and various artistic articles are, however, deservedly noted. Still more famous are the enormous breweries of Bavarian beer, which annually produce about 49,000,000 gallons, of which 37,000,000 are consumed in the city itself. Munich carries on a large trade in grain and in objects of art.

In 1158 Henry the Lion raised the *Villa Munichen* from its previous obscurity by establishing a mint and a salt-emporium within its precincts, the name (also appearing as *Forum ad Monachos*) being derived from the monks who owned the site. In the 13th century the dukes of the Wittelsbach dynasty selected Munich for their residence and fortified the town. In 1327 the old town was nearly destroyed by fire, and was rebuilt by the Emperor Louis the Bavarian very much on the plan which it still exhibits; but it was not until the fortifications were razed at the close of the 18th century that the limits of the town were enlarged to any extent. The true history of modern Munich is the account of its artistic development in the 19th century, with which the artists most closely identified are Klenze and Gärtner the architects, Schwanthaler the sculptor, and Cornelius and Kaulbach the painters. The modern Munich school of painting, headed by K. von Piloty and W. Diez, is characterised by marked realism in colour and detail, in contrast to the romanticism of the older masters.

See works by Sölti (1854), Reber (1876), Maillinger (3 vols. 1876), Regnet (1878), and Trautwein (13th ed. 1887); also Mrs Howitt-Watts' *Art-student in Munich* (2d ed. 1879).

Municipal Architecture is shown in the buildings used for municipal purposes, such as town-halls, guildhalls, &c. These were first built when the towns of the middle ages rose in importance, and asserted their freedom. Those of North Italy and Belgium were the first to move, and consequently we find in these countries the earliest and most important specimens of municipal architecture during the middle ages. Municipal buildings always partake of the character of the architecture of the period when they were erected. In Italy, for instance, they are of the Italian-Gothic style in Vicenza, Venice, Florence, &c. during the 13th, 14th, and 15th centuries. In Belgium, during the same period, they are of the northern Gothic style, and are almost the only really fine specimens of the civil architecture of the middle ages now extant. The Cloth-hall at Ypres, and the town-halls of Brussels, Louvain, Bruges (see BELFRY), Oudenarde, the Exchange at Antwerp, and many other markets, lodges, halls, &c. testify to the early importance of the municipal institutions in Belgium. We look for town-halls in vain in France or England till the development of industry and knowledge had made the citizens of the large towns so wealthy and important as to enable them to raise the municipal power into an institution. But from the 15th and 16th centuries there exist in Britain abundant instances of buildings erected for the use of the guilds and corporations and the municipal courts. Many of the corporation halls in London have recently been rebuilt by the wealthy bodies they belong to, such as the Fishmongers, Merchant Taylors, Goldsmiths, and other companies (see also GUILDHALL). Municipal buildings on a large scale for the use of the town-councils and magistrates have also been recently erected in many large towns in Britain; and now no town of importance is complete without a great town-hall for the use of the inhabitants.

It is a curious fact that in France, where the

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towns became of considerable importance during the middle ages, so few municipal buildings remain. This arises from the circumstance that the resources of the early municipalities of France were devoted to aid the bishops in the erection of the great French cathedrals, and the townspeople used these cathedrals as their halls of assembly, and even for such purposes as masques and amusements.

Municipality (from Lat. *municeps*, from *munus* and *capio*, 'one who enjoys the rights of a free citizen'), a town or city possessed of certain privileges of local self-government, the governing body in such a town. Municipal institutions originated in the times of the Roman empire. The provincial towns of Italy, which were from the first Roman colonies, as also those which, after having an independent existence, became members of the Roman state, though subjected to the rule of an imperial governor, were allowed to enjoy a right of regulating their internal affairs. A class of the inhabitants called the *curia*, or *decuriones*, elected two officers, called *duumviri*, whose functions were supposed to be analogous to those of the consuls of the imperial city, and who exercised a limited jurisdiction, civil and criminal. There was an important functionary in every municipality called the *defensor civitatis*, or advocate for the city, the protector of the citizens against arbitrary acts on the part of the imperial governor. The municipal system declined with the decline of the empire, yet it retained vitality enough to be afterwards resuscitated in union with feudalism, and with the Saxon institutions of Britain. Some cities of Italy, France, and Germany have indeed derived their present magistracy by direct succession from imperial Rome. For British Municipalities, see BOROUGH, CITY; see also FREE IMPERIAL CITIES.

Munjeet. See MADDER.

Munkacs, a market-town of Hungary, situated at the foot of the Carpathians, 101 miles by rail NE. of Debreczin, has mines of iron and rock-crystals, called Hungarian diamonds. The citadel, built on an isolated height, resisted the imperial arms for three years (1685–88); and, having fallen in 1848 into the hands of the Hungarians, was captured by the Russians in the following year. It is now a state-prison. Pop. 9691.

Munkacsy, MICHAEL, painter, whose real surname is LIEB, was born at Munkacs, 10th October 1846. He went a turner's apprentice to Vienna, and studied painting there, at Munich, and at Düsseldorf, and in 1872 settled in Paris. Except a few portraits, his works are nearly all genre-pictures. Three classes may be distinguished—those depicting Hungarian life, mostly very dark in colouring, as 'The Condemned,' 'Wartime,' 'Night-roamers,' 'Village Hero,' and others; those illustrative of the social life of Paris, much lighter and brighter in tone, as 'Munkacsy in his Studio,' 'Father's Birthday,' 'Two Families,' &c.; historical pieces, of which the best-known examples are 'Milton dictating *Paradise Lost* to his Daughters,' 'Christ before Pilate,' 'Crucifixion,' and 'Mozart's Last Moments.' Vigorous characterisation, dramatic power, and pictorial breadth are perhaps his most conspicuous traits.

Munnipore. See MANIPUR.

Munro, HUGH ANDREW JOHNSTONE, Latin scholar, born at Elgin in Scotland in 1819, was educated at Shrewsbury and Trinity College, Cambridge, elected fellow of his college in 1843, and professor of Latin in his university in 1869 (he resigned the chair in 1872), and died at Rome, 30th March 1885. His greatest achievement was an edition of *Lucretius* (1864; 4th ed. 1885), text, translation, and notes, one of the finest and most brilliant works of British scholarship. His reputation stands high moreover as a writer of Greek and Latin verse; the best pieces were published along with a Latin translation of Gray's *Elegy* in 1884. The edition of *Horace* (1869), *Criticisms and Elucidations of Catullus* (1878), several papers in the *Journal of Philology*, and a *Syllabus of Latin Pronunciation*, in co-operation with Prof. E. Palmer, constitute the remaining published work of this consummate scholar. See *Journ. of Phil.* (1885).

Munster, the largest of the four provinces of Ireland, occupies the south-west, and is bounded on the N. by Connaught, on the E. by Leinster, and on the W. and S. by the Atlantic. It contains the six counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford, and the country is described under these heads; see also IRELAND. Area, 6,064,579 statute acres. Pop. (1841) 2,396,161; (1861) 1,513,558; (1881) 1,331,115; and (1887) 1,206,795 (estimated). Of the total nearly 94 per cent. are Roman Catholics.

Münster, capital of Westphalia, stands on a small stream, by rail 101 miles N. by E. of Cologne and 106 SSW. of Bremen. It retains numerous remains of mediæval architecture, including the mixed Romanesque and Gothic cathedral, built between the 12th and 14th centuries, and despoiled of its internal decorations by the Anabaptists; Our Lady's Church, Gothic, built about 1340; the Gothic church of St Lambert, of the 14th century, from the original tower of which were suspended the three iron cages with the bodies of the Anabaptist leaders, John of Leyden, Knipperdolling, and Krechting, after they had been executed; the church of St Ludgerus, also Gothic, dating from 1330; the Gothic town-hall, in which, in 1648, the peace of Westphalia was signed (also signed simultaneously at Osnabrück, q.v.); the castle, built in 1767, and surrounded by fine pleasure-grounds, including botanical gardens; and the 16th-century town wine-cellar, in which are preserved some rare pictures of the old German school. The old Catholic university of Münster was dissolved in 1818; there is now an academy, with a Catholic theological and a philosophical faculty, and about 470 pupils. Attached to it are a library of 123,000 volumes, a natural history museum, and collections of art and antiquity. The industrial products of Münster include woollen, cotton, and silk fabrics, and paper, besides dyeing, printing, and enamelling. The trade is limited to linens, woollens, thread, cattle, corn, &c. Pop. (1875) 35,705; (1885) 44,060, of whom 36,751 were Catholics; (1890) 48,613. Münster was known under the name of Mimigardevord in the time of Charlemagne, who in 791 made it the see of the new bishop of the Saxons, St Ludgerus. Towards the middle of the 11th century a monastery (whence Münster) was founded on the spot, and by 1186 it had grown into a town. In the 12th century the bishopric was elevated into a principality of the empire. In the 13th century the city became a member of the Hanseatic League; and in 1532 it declared its adhesion to the Reformed faith, notwithstanding the violent opposition of the chapter. During 1535 Münster was the scene of the violent politico-religious movement of the Anabaptists (q.v.). The bishop repossessed himself of the city, and in 1661 Bishop Bernhard built a strong citadel within the walls, and deprived the citizens of nearly all their liberties. In both the Thirty Years' War and the Seven Years' War Münster suffered severely. The bishopric, which since 1719 had been held by the Archbishop of Cologne, although it retained a special form of government, was secularised in 1803, and divided among various reigning houses. The Congress of Vienna gave the greater part of the principality to Prussia, a

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small portion being apportioned to Oldenburg, while Hanover acquired the territories of the mediatised Dukes of Aremberg. The bishopric was reconstituted in 1821. See works by Erhard (1837), Cornelius (1855–60), Keller (1880), and Detten (1887).—There is another Münster in Alsace, 12 miles SW. of Colmar by rails; pop. 3390.

Münster, SEBASTIAN, scholar, was born at Ingelheim in the Palatinate in 1489, studied at Heidelberg and Tübingen, and became a Franciscan monk, but at the Reformation he embraced the new doctrines (1529). He then taught Hebrew and theology at Heidelberg, and from 1536 mathematics at Basel, in which city he died on 23d May 1552. He brought out the first Hebrew Bible (1534–35) edited by a German; wrote *Cosmographia* (1544), a work on geography that kept its ground for more than a century; and published a Hebrew grammar, a Chaldaic grammar (1527), and lexicon (1527), and a Latin-Greek-Hebrew dictionary (1530).

Muntjak (*Cervulus muntjac*). These small deer, of which there are several species, appear to connect the true deer with the Chevrotains (q.v.); they inhabit the forest tracts of the oriental region —i.e. India, China, Java, Sumatra, Formosa, and the Philippines. The males have large canine teeth as in the Chevrotains; the horns are borne upon a long pedicel covered with hair, which seems to resemble the 'horn' of the giraffe.

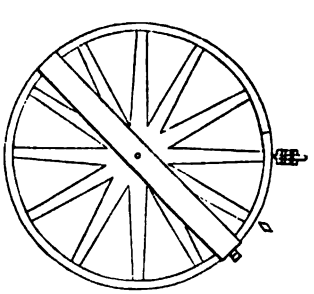
Muntz's Metal. See BRASS.

Münzer, THOMAS, one of the leaders of the Anabaptists (q.v.), was born at Stolberg, in the Harz, about 1489, studied theology, and in 1520 began to preach at Zwickau. His Christian socialism and his mystical doctrines soon brought him into collision with the Reformers and the town authorities. He thereupon made a preaching tour through Bohemia, Silesia, and Brandenburg, and settled in Thuringia (1523). Again deprived of his office, he visited Nuremberg, Basel, and other south German cities, and was finally in 1525 elected pastor of the Anabaptists of Mühlhausen, where he won the common people, notwithstanding Luther's denunciations of him, introduced his communistic ideas, and soon had the whole country in insurrection. But on 15th May 1525 he and his men were totally routed at Frankenhausen by Philip of Hesse. Münzer himself was captured in flight and executed on 30th May at Mühlhausen.

See Lives by Melanchthon (1525), Strobel (1795), and Seidemann (1842); also Ranke, *Zeitalter der Reformation* (vol. ii.), and Jörg, *Geschichte des grossen Bauernkriegs* (1850).

Muræna. See EEL.

Mural Circle, an astronomical instrument for the observation of celestial bodies at their meridian passage. It consists of a large metal circle, turning on an axis the end of which projects from a solid stone pier or *wall* (whence the name), close to which the circle moves. The plane of the circle is set as nearly as possible in the meridian. Fixed immovably to the circle is a telescope, which by turning the circle is made to point to the star to be observed, at the time of its meridian passage. Two wires, one fixed and one movable, similar to those in the Transit Circle (q.v.), enables the altitude, or zenith distance, of the star to be noted, if the instrument has been properly adjusted, and if the zenith or horizontal point on the circle be known. On the rim of the circle are divisions in degrees, &c., so that the angle through which it is turned can be noted by means of several microscopes, as in the transit circle. The mural circles once in use at Greenwich were six feet in diameter, and each degree of the division on the edge measured more than six-tenths of an inch in length. The manner of support allowed of a large circle, which gave this advantage. The mural circle is now almost obsolete, modern improvements enabling all its work to be much better done by the transit circle.



Mural Circle.

Mural Crown. See CROWN.

Mural Decoration dates from very ancient times. The Egyptian and Etruscan monuments form an integral and important part of the history of Painting (q.v.), and have helped to mould the development of certain styles of art (see ARABESQUE). Incised work and reliefs have been largely employed. The Greeks tinted their temples and 'picked out' their sculptured friezes and pediments with colour; coloured bricks were used in Assyrian, and wall tiles (see POTTERY) in Moslem, architecture. Some of the Roman walls were built of tufa and red brick, coloured brick, terra-cotta, and variegated arrangements of marble were largely used in Italy. The plaster-work known as Sgraffito (q.v.) is especially adapted for this use. Many English churches of the mediæval period have been built of flint and stone, and much Tudor work of parti-coloured brick. Distemper and Fresco are described in separate articles; water glass is a silicate process of which there is an example in the Houses of Parliament. Mosaic-work is extensively used in floors and ceilings, but also occasionally employed in mural decoration. The dado of the Albert Memorial Chapel at Windsor is composed of slabs of inlaid marble hatched with coloured gold cement. See also TAPESTRY, WALL-PAPER.

Another system is that known as Encaustic Painting (Gr. *encaustikē*, 'fixed by fire'), a manner of mural painting with a medium composed principally of wax, practised by the ancients. As the name implied that fire was used in the execution, some have been led to suppose that encaustic painting was the same as enamel painting; but notices by Pliny and other writers show clearly that it was a species of painting in which the chief ingredient used for uniting and fixing the colours was wax dissolved by heat. Various attempts have been made in modern times to revive it. About the middle of the 18th century Count Caylus and Bachelier, and in 1792 Mrs Hooker of Rottingdean, under the name of Emma Jane Greenland, made various successful experiments with this view. Encaustic painting was again taken up in Germany under the patronage of Louis I. of Bavaria, who commissioned Louis Schnorr to execute a series of historical subjects on the walls of the royal palace, Munich. For preparing her medium Mrs Hooker dissolved gum-arabic in water, afterwards adding gum-mastic, which was dissolved by stirring and boiling, and when the mixture had reached the boiling-point she put in the wax. After painting the picture, she passed a thin coating of melted wax over it with a hard brush, and then drew over the surface an iron—for ironing linen—moderately heated. After the picture cooled it was rubbed with a fine linen cloth. The German method is somewhat similar, but some other ingredients are used; among these, potash with the wax; and, in place of an iron being passed over the surface, the wax is brought to the surface by a vessel containing fire being held at a

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little distance from the picture. It is also possible to employ a medium made of a mixture of turpentine and beeswax sufficiently plastic to be worked like oil. A modification of the system was also devised by Mr Gambier-Parry, and is known as Spirit Fresco. By his method the walls are coated with wax and gum compounded with spirit of lavender. The colours are ground with the same medium.

Murano, famous as the seat of the Venetian glass manufacture, is an island and town a little more than a mile north of Venice, with 3600 inhabitants. It possesses a fine 12th-century cathedral, and another church with some valuable pictures, including Paul Veronese's 'St Jerome in the Desert.' But the chief interest centres in the glass-factories —an industry established in the 13th century, and revived in 1860 by Antonio Salviati (1816–90).

Murat, JOACHIM, king of Naples, was the son of an innkeeper at La Bastide-Fortunière, near Cahors, in France, and was born 25th March 1771. He was at first intended for the priesthood, but the outbreak of the Revolution fired his enthusiasm; he entered the army, and soon rose to the rank of colonel. Attaching himself closely to Bonaparte, he served under him in Italy and in Egypt, distinguishing himself in many battles; rose to the rank of a general of division (1799); returned with Bonaparte to France, and rendered him most important assistance on the 18th Brumaire, by dispersing the Council of Five Hundred at St Cloud. Bonaparte now entrusted him with the command of the Consular Guard, and gave him his youngest sister, Caroline, in marriage. Murat held his usual post, the command of the cavalry, at Marengo, where he covered himself with glory, and in 1801 was nominated governor of the Cisalpine Republic. On the establishment of the French empire he was loaded with honours. He continued to command the cavalry in the armies led by the emperor, and contributed not a little to the victory at Austerlitz (1805), at Jena, at Eylau, and to many other victories. In 1806 the newly-erected grand-duchy of Berg (q.v.) was bestowed upon him, and on 1st August 1808 he was proclaimed king of the Two Sicilies by the style of Joachim I. Napoleon. He took possession of Naples, but the Bourbons, supported by the fleet of Britain, retained Sicily. By the moderation of his government he won the hearts of his subjects. In the expedition against Russia he commanded the cavalry, and indeed the army after Napoleon left it. After crushing the Austrians at Dresden (1813), and helping to fight the disastrous battle of Leipzig, he concluded a treaty with Austria, and a truce with the British admiral, and promised the allies an auxiliary corps; but, as soon as he learned of Napoleon's escape from Elba and return to France, he commenced a hasty war against Austria. He was, however, defeated at Ferrara (12th April 1815), and again at Tolentino (2d May). With a few horsemen he fled to Naples, where all was insurrection and commotion; thence he found his way to France. After Napoleon's final overthrow, he took refuge in Corsica, from which he proceeded with a few followers to the coast of Calabria, and proclaimed himself king and liberator, but, being presently taken prisoner, was tried by court-martial, and shot at Pizzo, on 13th October 1815. See biographical accounts by Gallois (Paris, 1828), Coletta (Paris, 1821), and Helfert (Vienna, 1878).—His widow (1782-1839) assumed the title of Countess of Lipona, and resided in the neighbourhood of Trieste till her death. His two sons went to the United States, where the elder, NAPOLÉON ACHILLE (1801–47), settled in Florida, married a niece of Washington, and published *Exposition des Principes du Gouvernement Républicain en Amérique* (1833). The younger, NAPOLÉON LUCIEN CHARLES (1803–78), suffered reverses in fortune; but, returning to France after the revolution of 1848, he attached himself closely to Louis Napoleon, who in 1849 sent him as ambassador extra-ordinary to Turin, and in 1852 made him a senator.

Muratori, LODOVICO ANTONIO, Italian antiquary and historian, was born at Vignola, in the duchy of Modena, 21st October 1672. His life was devoted mainly to researches in history, especially the history of his native country. In 1695 he was appointed a librarian of the Ambrosian Library at Milan. His first work was to issue collections of inedited Latin fragments, *Anecdota Latina*, followed later by *Anecdota Græca*. In 1700 he was recalled by the Duke of Modena to take charge of the D'Este Library and the ducal archives at Modena. In 1723 the first folio volume of his great collection, *Rerum Italicarum Scriptores*, was published, and between that date and 1751 twenty-eight more. This work contains all the chronicles of Italy from the 5th to the 16th century, illustrated with commentaries and critical notices. It was accompanied by a collection of dissertations illustrative of the religious, literary, social, political, military, and commercial relations of the several states of Italy during the same period, in 6 vols. folio, 1738–42, a work which, although far from being free from errors, is still regarded as a treasure-house of mediæval antiquities. Muratori likewise undertook a general history of Italy (*Annali d'Italia*, 12 vols. 4to, 1744–49); compiled in two vols. *Antichità Estensi* (1717); and published *Antiquitates Italicæ Medii Ævi* (6 vols. 1738–42), and a collection of Ancient Inscriptions (6 vols. 1739–42). In his later years he was attacked by the Jesuits on the ground of teaching heresies; but he found a protector in Pope Benedict XIV. He died at Modena, 23d January 1750. The *Antiquitates Italicæ* (vol. iii.) contains a catalogue or canon of the New Testament Scriptures, a fragment (the 'Muratorian Fragment'), apparently drawn up by a contemporary of Irenæus; see BIBLE, Vol. II. p. 126. Lightfoot assigned it to Hippolytus; see his *Clement of Rome* (vol. ii. 1890). Muratori's *Collected Works* fill 36 volumes (Arezzo, 1767–80), and 48 volumes in another edition (Venice, 1790–1810). See the Life by his nephew (1756).

Murchison, SIR RODERICK IMPEY, geologist and geographer, was born at Tarradale, Ross-shire, 19th February 1792. He was educated at the grammar-school of Durham and the Military College, Great Marlow. He entered the army at an early age, served as an officer in Spain and Portugal, and was present at Vimiero and the retreat to Corunna. Quitting the army in 1816, he devoted himself to science, especially geology, and travelled in various parts of the globe. He found the same sedimentary strata lying in the earth's crust beneath the old red sandstone in the mountainous regions of Norway and Sweden, in the vast and distant provinces of the Russian empire, and also in America. The result of his investigations was the discovery and establishment of the Silurian system, which won for him the Copley Medal of the Royal Society, and European reputation as a geologist. His subsequent exposition of the Devonian, Permian, and Laurentian systems increased and confirmed his reputation. He explored several parts of Germany, Poland, and the Carpathians; and in 1840–45, with De Verneuil and others, carried out a geological survey of the Russian empire. Struck with the resemblance in geological structure between the Ural Mountains and the Australian chain, Murchison in 1844 first predicted the discovery of gold in Australia. He was president of the British Association in 1846,

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and of the Royal Geographical Society in 1844–45, was re-elected in 1857, and continued to hold that post till 1870, when he was compelled to resign it by paralysis. Perhaps no contemporary did more to promote geographical science at home, and kindle the spirit of adventure among those engaged in Arctic exploration on the one hand and African discovery on the other. In 1855 he was made director-general of the Geological Survey and director of the Royal School of Mines. His investigations into the crystalline schists of the Highlands established a striking instance of regional metamorphism on a large scale. He was a vice-president of the Royal Society, and a foreign member of the French Academy, was knighted in 1846, and made a baronet in 1863. In 1870 he founded the chair of Geology in Edinburgh University. He died 22d October 1871. Most of his contributions to science appeared in the *Transactions* of the Geological and other Societies. His principal works were *The Silurian System* (1839); *The Geology of Russia in Europe and the Ural Mountains* (1845; 2d ed. 1853). See Life by Professor Arch. Geikie (1875).

Murcia, an ancient town of Spain, on the left bank of the Segura, by rail 46 miles SW. of Alicante and 50 N. by W. of Cartagena. It stands in the productive vale of Murcia, an old-fashioned Moorish town, embosomed in gardens of mulberry, orange, fig, palm, and other fruit trees. Almost the only notable buildings are the bishop's palace and the cathedral, this last begun in 1353, but reconstructed in 1521, and surmounted by a fine bell-tower. Silks, saltpetre, soda, gunpowder, musical instruments, and glass are manufactured; fruit-growing, the preparation of olive-oil, and the weaving of esparto also flourish. Pop. (1877) 91,805; (1887) 98,538. Alfonso X. of Castile took the city from the Moors in 1263; an earthquake almost destroyed it in 1829; and it was captured by the insurgents in 1843.—The *province* of Murcia has an area of 4478 sq. m. and pop. (1887) of 491,438. Along with the present province of Albacete it was an independent Arab kingdom for 27 years in the 13th century.

Murder is the unlawful and intentional killing of a human being by a human being. The most compendious statement of the distinctions drawn by the law of England between murder and manslaughter is given by Sir James Fitzjames Stephen in article 223 of his *Digest of the Criminal Law*. He says: 'Manslaughter is unlawful homicide without malice aforethought. Murder is unlawful homicide with malice aforethought. Malice aforethought means any one or more of the following states of mind preceding or co-existing with the act or omission by which death is caused, and it may exist when that act is unpremeditated: (*a*) an intention to cause the death of, or grievous bodily harm to, any person, whether such person is the person actually killed or not; (*b*) knowledge that the act which causes death will probably cause the death of, or grievous bodily harm to, some person, whether such person is the person actually killed or not, although such knowledge is accompanied by indifference whether death or grievous bodily harm is caused or not, or by a wish that it may not be caused; (*c*) an intent to commit any felony whatever; or (*d*) an intent to oppose by force any officer of justice on his way to, in, or returning from the execution of the duty of arresting, keeping in custody, or imprisoning any person whom he is lawfully entitled to arrest, keep in custody or imprison, or the duty of keeping the peace, or dispersing an unlawful assembly, provided that the offender has notice that the person killed is such an officer so employed.' If the act of killing is done in the heat of passion caused by provocation, it is not murder, but manslaughter. The law presumes that every one who has killed another has murdered him, unless there are circumstances in the case to raise a contrary presumption. Murder is punished by death, manslaughter by penal servitude for life, or by a fine, according to the degree of culpability involved in the crime. The law of Scotland does not substantially differ from that laid down by Sir James Stephen, the chief distinction being that what in England is called manslaughter is in Scotland called culpable homicide. In the United States the only noteworthy distinction from the law of England is the recognition of different degrees of murder. An early act of the legislature of Pennsylvania distinguishes murder by poison or waylaying, or any other deliberate and premeditated killing, or murder committed in the furtherance of any arson, rape, robbery, or burglary, as murder of the first degree, and murder of all other kinds as murder of the second degree. The statute law of other states has similar provisions. In England and Wales during 1856–88 the maximum number of murders (as returned by coroner's inquests) in any one year was 272 in 1866, the minimum 153 in 1879. During that same period the minimum number of executions was 4 in 1871, the maximum 23 in 1875 and 1877. According to a paper in the *Journal of the Statistical Society* for 1885, the proportion of homicides of all kinds to population was in England and Wales 1 to 63,000, and in the United States 1 to 43,000. From differences in legal classification and administration, it is notoriously difficult to compare the frequency of murder in different countries. But an estimate has been made that, whereas in England there are 7·1 murders per 10,000 deaths, in Germany the proportion is 6·4 murders to 10,000, in France 8, in Austria 8·8, in Switzerland 13·8, in Spain 23·8, in Italy as many as 29·4 per 10,000 deaths. The arguments for and against the abolition of Capital Punishment (q.v.) have been discussed in a separate article; see also EXECUTION, BIRTH (CONCEALMENT OF), SUICIDE; and Holtzendorff, *Die Psychologie des Mordes* (1875).

Murdock, or MURDOCH, WILLIAM, inventor of gas for illuminating purposes, was born 25th August 1754, near Auchinleck, Ayrshire. His family traced their descent from some Flemish architects or engineers; and his father, a millwright and miller near Old Cumnock, designed the first iron-toothed gearing in Great Britain. Murdock worked under his father till he was twenty-three, then entered the employment of Boulton & Watt, Birmingham, and showed such marked ability that he was sent to Cornwall to superintend the erection of mining engines there. At Redruth he constructed in 1784 the model of a high-pressure engine to run on wheels. Watt showed some jealousy at these efforts; but Boulton offered him a reward for an engine capable of carrying two persons and the driver. His labours in Cornwall were arduous, though he had not more than £1 per week up till his forty-fourth year; and, a request for an increase of salary not being promptly acceded to, he made up his mind to change. The mining companies at last realising the value of his services, offered him £1000 a year as chief engineer at the mines. But he declined, returning to Boulton & Watt, who gave him a like salary as general manager of Soho Works. Murdock's inventive brain was never idle; he introduced labour-saving machinery, a new method of wheel rotation, and an oscillating engine (1785) of a pattern still in use. He also improved Watt's engine; introduced a method of casting steam cases for cylinders in one piece, instead of in segments; a rotatory and compressed-air engine; a steam gun; cast-iron cement; a method of heating

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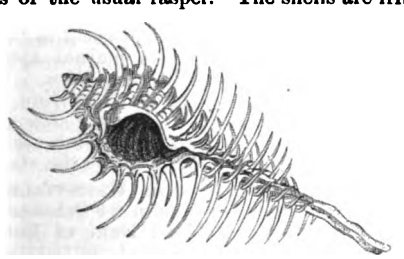
by circulating water through pipes; a method of sending messages through an exhausted air tube; and many other inventions. His investigations in the distillation of coal-gas began at Redruth in 1792, when he lighted his offices and cottages by its agency. He publicly showed the results in 1797 and in 1798, the premises at Soho being lighted with gas. But he did not reap due profit from this useful invention. Murdock read a paper on the *Economical Uses of the Gas from Coal* before the Royal Society in 1808. He died in 1839.

Mure, SIR WILLIAM, of Rowallan in Ayrshire, Scottish poet, was born in 1594, a nephew of the author of *The Cherrie and the Slae*. He was wounded at Marston Moor, and died about the end of 1657. He translated into English sapphics Boyd of Trochrig's Latin poem, *Hecatombe Christiana*, but his principal work is his *True Crucifixe for True Catholikes* (Edin. 1629). His fine version of the Psalms dates from 1639. See Lyle's *Ancient Ballads and Songs* (1827).

Mure, WILLIAM, was born at Caldwell in Ayrshire in 1799, educated at Westminster and the universities of Edinburgh and Bonn, represented Renfrewshire 1846–55, was Lord Rector of Glasgow University 1847–48, and died in London, 1st April 1860. Colonel Mure was for many years commandant of the Renfrewshire militia. He was the author of *A Critical Account of the Language and Literature of Ancient Greece* (5 vols. 1850–57), a work of sound scholarship and great learning; he maintains the unity of the Homeric poems. Mure also wrote *Journal of a Tour in Greece* (1842) and a couple of treatises on Egyptian chronology.

Muret (MURETUS), MARC ANTOINE, a celebrated humanist, was born at Muret, near Limoges, 12th April 1526. In early life in France he read lectures on civil law with great success, but subsequently in Italy he seems to have devoted himself entirely to literature till 1576, when he took orders. He afterwards resided in Rome till his death, 4th June 1585. His well-known *Orations*, though shallow, are remarkable examples of elocution in the style of Cicero. His poems, Latin and French, though graceful and fluent, are now considered worthless; but his learned criticisms and commentaries, *Variæ Lectiones*, in 5 books, are held in great estimation. There are editions of his works by Ruhnken (1789) and Frotscher (1834–41), and 2 vols. of *Scripta Selecta* (1871–73) by Frey. See also the monograph by Dejob (Paris, 1881).

Murex, a genus of marine Gasteropods in the same set as buckies, cone-shells, and cowries. The members prey upon other molluscs, boring by means of the usual rasper. The shells are fringed



Woodcock-shell (*Murex tenuispina*).

with numerous spines in a very quaint and beautiful fashion, to which some names, as 'Venus Comb,' obviously refer. Several species, especially *M. trunculus* and *M. brandaris*, used to be crushed to furnish the famous dye of Tyrian purple. A few species occur on British coasts.—For *Murexide* (Purpurate of Ammonia, or Roman Purple), see DYEING, Vol. IV. p. 139.

Murfreesborough, capital of Rutherford county, Tennessee, and from 1819 to 1826 capital of the state, is 33 miles by rail SE. of Nashville, and has several mills and factories. Close by the bloody battle of Stone River was fought, 31st December 1862 and 2d January 1863, between Generals Rosecrans and Bragg; the Confederate army was compelled to retreat, but the losses on both sides were nearly equal—National forces, 9511; Confederates, 9236. Pop 3800.

Mürger, HENRI, novelist and poet, was born in Paris on March 24, 1822. He began life as a notary's clerk, and afterwards acted as secretary to Count Tolstoi, at a salary of about a pound a week. He gave himself to literature, and for several years led the life of privation and adventure which he has described in his *Scènes de la Vie de Bohème* (1845). At last his genius was recognised by Arsène Houssaye, the editor of the *Artiste*, and during his later years his popularity was secure. Every journal was open to him, but he wrote slowly and fitfully in the intervals of dissipation, and was never in easy circumstances. He died in the hospital in Paris on January 28, 1861. His first and best novel, *Scènes de la Vie de Bohème*, is, says Mr Saintsbury, a work final and perfect, which deserves a place in the literature of humanity. A vivid transcript from the scenes, alternately sombre and jovial, of the writer's years of struggle, it is in parts infinitely pathetic, in parts irresistibly amusing. Mürger had a rich gift of humour, but his predominant tone is one of poignant melancholy. *Le Manchon de Francine* is one of the saddest, as it is one of the most beautiful, short stories ever penned. He had uncommon literary skill, and could portray certain types of character admirably. But he had only one subject which he could handle successfully—the Bohemia of literary Paris. Next to the *Scènes de la Vie de Bohème*, his best prose works are *Scènes de la Vie de Jeunesse*, *Les Buveurs d'Eau*, and the short tales included in the volume entitled *Madame Olympe*. His poems, *Les Nuits d'Hiver*, are graceful, sincere, and often deeply pathetic, bearing strong traces of the influence of Musset. One of them, *La Chanson de Musette*, is a lyric masterpiece—'a tear,' said Gautier, 'which has become a pearl of poetry.' Several of Mürger's pieces have been translated with rare felicity by Mr Andrew Lang in his *Lays of Old France*. Mürger was likewise the author of *Le Dernier Rendezvous*, *Scènes de Campagne*, *Le Pays Latin*, *Le Sabot Rouge*, *Les Vacances de Camille*, &c.

See the notices of Mürger by Gautier, Houssaye, Janin, and Saint-Victor in *Les Nuits d'Hiver* (1862).

Murghab, a river that rises in the mountains north-east of Herat in Afghanistan, flows north-west, and loses itself in the desert of Turkestan beyond Merv.

Muriatic Acid. See HYDROCHLORIC ACID.

Muridæ, a family of rodent quadrupeds, containing many genera and a very large number of species, distributed over all parts of the world, and of which rats and mice may be regarded as typical examples. To this family belong also voles, lemmings, dormice, jerboas, marmots, &c.

Murillo, BARTOLOMÉ ESTEBAN, was born of humble parentage at Seville, and baptised January 1, 1618; and, after receiving some education, was placed with his relative, Juan del Castillo, to study painting. Having saved a little money, which he made by painting somewhat stiff and rough religious pictures for the fairs of Seville and for exportation to South America, he went to Madrid in 1641, being then in his twenty-fourth year; was favourably noticed by his celebrated townsman Velasquez; and through his influence was enabled to study the *chefs-d'œuvre* of Italian

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and Flemish art in the royal collections. In 1645 he determined to return to Seville, though advised to proceed to Rome by Velasquez, who offered him letters from the king. After settling in Seville, he painted eleven large and remarkable pictures for the convent of San Francisco. He at once became famous, and, receiving numerous important commissions, was soon acknowledged as the head of the school there. In 1648 Murillo married a lady of fortune; he now maintained a handsome establishment, and his house was the resort of people of taste and fashion. About this time he passed from his first or 'cold' style—dark with decided outlines—to his second or 'warm' style, in which the drawing is softer and the colour improved. Of the second style good examples are 'St Leander,' the 'Nativity of the Virgin,' and 'St Antony of Padua.' In 1656 he was engaged on four great semicircular pictures, which are the first examples of his third or 'vaporous' manner, the outlines vanishing in a misty blending of light and shade. The three styles, it should be said, are not strictly chronological, the warm style constantly reappearing. The Academy of Seville was founded by him in 1660, but he filled the office of president only during the first year. After this came Murillo's most brilliant period; eight of the eleven pictures painted in 1661–74 for the almshouse of St Jorge, including 'Moses striking the Rock,' 'Abraham and the Angels,' 'The Miracle of the Loaves and Fishes,' 'St Peter released from Prison,' and 'St Elizabeth,' are accounted his masterpieces. He executed some twenty pieces for the Capuchin Convent after 1675. He frequently chose the Immaculate Conception or Assumption of the Virgin as a subject, and treated them much alike; the famous 'Conception' now in the Louvre was sold in 1852 at the sale of Marshal Soult's pictures for £24,000. In 1681 he went to Cadiz, and while there fell from a scaffold when painting an altarpiece in the church of the Capuchins, returned to Seville, and soon after died from the injury he received, April 3, 1682. Murillo's pictures naturally fall into two great groups—scenes from low life, Gypsies and beggar children (mostly executed early in his life), and scripture and religious works. Of the former, by which he is largely known abroad, very few are to be seen in Spain. Though his best pictures show much technical skill, truth to nature, and sentiment of a kind, they seldom show ideal beauty or sublimity of feeling.

See Miss E. E. Minor's *Murillo* ('Great Artists' series, 1882), and C. B. Curtis' *Velasquez and Murillo* (1883), the latter giving a list of 481 pictures by Murillo—105 in London, 99 elsewhere in England, 61 in Madrid, 59 in Seville, 21 in Paris, 24 in Russia, &c.

Murphy, ARTHUR, dramatic and miscellaneous writer, was born in Roscommon, Ireland, in 1727. Intended by his father for business, he was placed in a London bank, but having, during his education at the college at St Omer, in France, made extraordinary proficiency in Greek and Latin, he contracted literary and dramatic tastes. In 1752–74 he published the *Gray's Inn Journal*, a weekly paper which obtained him the acquaintance of Dr Johnson. Being disappointed of some expectations and already in debt, he went on the stage, and made his first appearance as Othello. In one season he paid his debts, and then left the stage with £400 in his pocket; and, determining to study law, he entered Lincoln's Inn in 1757. In 1758 he produced his first play, *The Upholsterer*, a successful farce; in 1762 he was called to the bar, but with so poor a result that in 1788 he retired. He continued to write comedies and other plays for the stage, and is said to have produced more stock pieces than any man of his time. His translation of Tacitus (1793) is excellent; but his *Essay on Johnson* and *Life of Garrick* did not add to his fame. His dramatic works fill 8 vols. Late in life he became a Commissioner of Bankrupts, and enjoyed a pension of £200 a year. He died in 1805. See his Life by Jesse Foot (1811).

Murrain is the generic term loosely used to designate a variety of diseases of domestic animals, but more generally restricted to the vesicular epizootic, popularly known as the foot-and-mouth disease. It is a contagious, infectious eruptive fever, affecting cattle, sheep, pigs, and poultry; but is rarely communicable to horses or men. It is characterised by the appearance of little bladders or vesicles in the mouth, on the lips, gums, and tongue, on the coronets and interdigital spaces of the feet, causing inability to eat, drivelling of saliva, sometimes heat and swelling of the udder, and lameness. The disorder runs a fixed and definite course usually in eight or ten days. Good nursing, comfortable lodgings, and a liberal supply of soft, easily digestible food, are the chief requisites for speedy recovery. A laxative may be given if needed. The mouth may be washed out twice daily with a mild astringent solution, which may be made with half an ounce of alum, oxide of zinc, or sugar of lead, to the quart of water. When the udder in milch cows, in which the complaint is usually most serious, is affected, it should be bathed with tepid water before and after milking, which must be attended to very regularly, the feet kept clean, loose horn removed, and washed occasionally with the lotion used for the mouth. See also ANTHRAX, CATTLE-PLAGUE, PLEURO-PNEUMONIA.

Murray, ALEXANDER, philologist, was born the son of a shepherd at Dunkitterick in Urr parish, Kirkcudbright, 22d October 1775, and had hardly any education save what his father could impart, till 1788, when he was at school for a short time. Yet by diligent and omnivorous reading of all such books as fell in his way or could be borrowed, he, when engaged as a shepherd, acquired, besides a scholarly knowledge of English literature, a mastery of the classics, all the principal European tongues, and Hebrew. The fame of the learned shepherd led to an invitation to Edinburgh, where he obtained a bursary, gave private lessons, and continued his linguistic labours, which were extended to oriental tongues and ancient and modern Abyssinian. In 1806 he became minister of Urr, in 1812 professor of Oriental Languages in Edinburgh University; but he died 15th April 1813. His *History of the European Languages* was published in 1823.

Murray, DAVID CHRISTIE, novelist, was born 13th April 1847, at West Bromwich, in Staffordshire, and had served as reporter and then as war-correspondent (1877–78) for several newspapers, when in 1879 he published *A Life's Atonement* in 'Chambers's Journal.' In the same journal appeared *Val Strange* and *John Vale's Guardian*. Other works are *By the Gate of the Sea*, *The Way of the World*, *Aunt Rachel*, *Old Blazer's Hero*, *The Weaker Vessel*, *A Dangerous Catspaw*, &c. In 1889 he visited Australia and went on the stage.

Murray, EUSTACE CLARE GRENVILLE, the 'Roving Englishman,' was born 2d October 1819, the natural son of the second Duke of Buckingham. After studying at Oxford, he served till 1849 in the Austrian army; in 1851 joined the British embassy at Vienna as attaché; in 1853–54 went on a special mission to the islands in the Ægean Sea; in 1857 was attaché at Teheran; and in the next year consul-general at Odessa. For exposing in the public press in 1866 certain abuses connected with the foreign office he was dismissed the service. He spent the rest of his life in Paris, and died at Passy, on 20th December 1881. As a journalist he is best known for his

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brilliant papers in the *Daily News* and *Pall Mall Gazette*, and as an author by *The Roving Englishman* (1854–55), *Embassies and Foreign Courts* (1855), *History of the French Press* (1874), *Men of the Second Empire*, &c. (1872–74), and a few brilliant novels. Of the last, *The Member for Paris* (1871) is the cleverest, but *Young Brown* (1874), from the circumstances of its hero's birth, has the most interest.

Murray, JAMES A. H., philologist, was born at Denholm, Roxburghshire, in 1837, received his elementary education at Minto school, removed to Hawick, and was appointed assistant-teacher in the parish school there, and afterwards master of a subscription academy. He next removed to London, filling the post of foreign correspondent in the Oriental Bank for some years; he afterwards became senior assistant-master at Mill Hill school. Dr Murray has been twice president of the Philological Society (1879–80), is a graduate of London University, and LL.D. of Edinburgh University. His work on the *Dialects of the Southern Counties of Scotland* (1873) established his reputation as a philologist. He is familiar with almost all the European languages and a large number of oriental tongues. The great work of his life, the editorship of the Philological Society's New English Dictionary, issued by the Clarendon Press, was begun while at Mill Hill (1879), an iron building in his garden there being utilised for the assortment of the two tons of material to which he fell heir from his predecessors in the editorship, Herbert Coleridge and Dr Furnivall. This work has been continued at Oxford, where Dr Murray has, with a staff of assistants, devoted his whole attention to the task. Dr Murray has fought his way to the front rank as an authority in the history and derivation of words, and his great English Dictionary is the most thorough and important work of the kind ever undertaken in Britain. A civil list pension of £270 per annum was conferred upon him in 1884.

Murray, JOHN, the name of four generations of English publishers, will for ever remain associated with the palmiest days of English literature in the 18th and 19th centuries. The founder of the house, John M'Murray, was born in Edinburgh in 1745. He obtained a commission in the Royal Marines in 1762, and in 1768 was still second-lieutenant, when, disgusted with the slowness of promotion, he purchased the bookselling business of Paul Sandby, 32 Fleet Street, London, and, dropping the Scottish prefix, became a bookseller and publisher. He brought out the *English Review*, and published the first two volumes of the elder Disraeli's *Curiosities of Literature*, &c. He died November 16, 1793, and was succeeded in due time by his son JOHN (born November 27, 1778), a minor of fifteen at his father's death, who was for a short time associated as partner with his father's shopman, Mr Highley. One of the earliest hits of John the second was Mrs Rundell's Cookery-book, of which over 300,000 copies were sold. He became connected with Mr Stratford Canning, afterwards Lord Stratford de Redcliffe, through the assistance he lent him and other Etonians with their publication of *The Miniature*. In 1808–9 he projected the *Quarterly Review*, a Tory organ, in opposition to the Whig *Edinburgh Review;* his first step being to obtain Canning's countenance. A severe criticism of Scott's *Marmion* in the *Edinburgh Review* suggested to Murray a visit to Scott; he secured his co-operation, as also that of Heber, Canning, George Ellis, and Sir John Barrow. The first number was published February 1, 1809, under the editorship of William Gifford. The new periodical was completely successful, attaining a circulation of 18,000 copies, and brought Murray into communication not only with the chief literati, but also with the Conservative statesmen of the time. A still more fortunate connection was that with Lord Byron (1810), whom he offered £600 for the first two cantos of *Childe Harold* (published 1812). Murray now removed from Fleet Street to Albemarle Street, where the business is still carried on. Here Byron and Scott first met, and here Southey made the acquaintance of Crabbe. Almost all the literary magnates of the day were 'four o'clock visitors' in Albemarle Street—'wits and bards; Crabbes, Campbells, Crokers, Freres, and Wards.' Murray paid Byron nearly £20,000 for his works, and his dealings with Crabbe, Moore, Campbell, and Irving were princely. He had at one time dealings with Constable and Ballantyne, but never approved of their methods of business. Hearing that Byron was in difficulties in 1815, he sent him a cheque for £1500, promised another for the same amount, and even offered to sell the copyright of his works on his behalf if necessary. (As to Byron's autobiography, see BYRON, Vol. II. p. 598). Perhaps his only unsuccessful venture was the *Representative* (1826) newspaper; his 'Family Library' was begun in 1829, and he issued the travels of Mungo Park, Belzoni, Parry, Franklin, and others. The second John Murray died in his sixty-fifth year, June 27, 1843, and was succeeded by his son, JOHN MURRAY the third, born in 1808, and educated at the Charterhouse and at Edinburgh University. A more practical and realistic age had succeeded that of Byron, and the 'Home and Colonial Library' was the precursor of much of the cheap railway and other literature of the present day. Many of the greatest works in history, biography, travel, art, and science have been issued by the third Murray. Among his successes may be mentioned Dr Livingstone's *Travels* and *Last Journals*, Smiles's *Life of George Stephenson*, *Self-help*, of which more than 150,000 have been sold, Darwin's works, Dr Smith's dictionaries, and the well-known *Handbooks for Travellers* (begun 1836; see GUIDEBOOKS), of the first five of which he was author, and all of which owe much to his superintendence. His son, the fourth JOHN MURRAY, is now a member of the firm. See S. Smiles, *A Publisher and His Friends* (1891).

Murray, JOHN (1741–1815), was the founder of Universalism (q.v.) in America.

Murray, LINDLEY, grammarian, was born at Swetara, Lancaster county, Pennsylvania, in 1745, the eldest of twelve children, and was educated at a school in Philadelphia belonging to the Society of Friends. On his father's removal to New York he was placed in a counting-house, but his thirst for study was so ardent that he escaped to a school in New Jersey. He then studied law, and was admitted to the bar at the age of twenty-one, and commenced a good practice. During the revolutionary war he engaged in mercantile pursuits with such success as to accumulate a handsome fortune. In 1767, his health failing, he came to England and purchased the estate of Holdgate, near York, where he devoted himself to literary pursuits. In 1787 he published his *Power of Religion on the Mind*, which passed through nineteen editions, and was translated into French. His *Grammar of the English Language* was issued in 1795, and was followed by *English Exercises*, the *Key*, the *English Reader*, *Introduction and Sequel* (both translated into French), a *Spelling Book*, *A First Book for Children*, *A Compendium of Faith and Practice*, and *The Duty and Benefit of a Daily Perusal of the Scriptures*. The lesson-books all passed through numerous large editions, and there can be no stronger indication of how entirely the

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systematic study of the English language had been, until recent years, neglected by scholars than the fact that Murray's Grammar was for half a century the standard text-book throughout Britain and America. Murray wrote an autobiography to the year 1809, which was published after his death, February 16, 1826.

Murray, THE REGENT. See MORAY.

Murray River, the principal river of Australia. It rises in the Australian Alps, flows north-west along the frontiers of New South Wales and Victoria, and in South Australia passes southward through the shallow Lake Alexandrina towards the sea at Encounter Bay. In its 1120 miles' length it drains 270,000 sq. m.; it is navigable for small steamers as far as Albury, 190 miles NE. of Melbourne, but its mouth cannot be entered by ships of any size. The chief tributaries are the Lachlan and Murrumbidgee and the Darling (q.v.), themselves large rivers. See also AUSTRALIA, NEW SOUTH WALES, VICTORIA.

Murshidabad, a town of India, situated on the left bank of the Bhagirathi, a branch of the Ganges, 124 miles N. of Calcutta. During the 18th century it was the capital of Bengal and a very populous city; but about the time (1790) the British made Calcutta their headquarters Murshidabad began to decline. In 1881 its population was only 39,231. The chief buildings of note are the palace of the Nawab (1837), the imambara, and a Mohammedan mosque. Two miles south of the city is Motijhil or Pearl Lake; on its bank stood the palace of Suraj-ud-Dowlah, in which Clive enthroned Mir Jafar, and the English Residents—Warren Hastings the first—dwelt. On the opposite side of the river is the old cemetery of the Nawabs, containing a mausoleum, mosque, &c. The city is noted for its ivory-carving, its embroidery in gold and silver lace, silk-weaving, and the manufacture of hookah pipes and musical instruments. It is moreover a busy centre of trade. The *district* has an area of 2144 sq. m. and a pop. of 1,226,790.

Murten, battle. See MORAT.

Murviedro, a town of Spain, 18 miles NNE. of Valencia, stands on the site of the ancient Saguntum, a Greek colony, the siege of which by Hannibal (q.v.) was the beginning of the second Punic war. Pop. 6287.

Murzuk. See FEZZAN.

Musaceæ, a natural order comprising the largest of herbaceous plants, generally destitute or almost destitute of true stems, yet resembling trees in appearance, and sometimes rivalling palms in stateliness, the long sheathing bases of the leaf-stalks combining to form a false stem. The blade of the leaf has many fine parallel veins proceeding from the mid-rib to the margin. The flowers are congregated on spadices, which are protected by spathes. The fruit is either a 3-valved capsule or fleshy. The species are not numerous; they are natives of warm climates, in which they are widely distributed, and are of great value to the inhabitants of tropical countries; the fruit of some, particularly of the genus Musa, being much used for food, whilst the fibres of the leaves are employed for cordage and for textile purposes (see BANANA, ABACA, FIBROUS SUBSTANCES). A very interesting plant of the order Musaceæ is the Traveller's Tree (q.v.) of Madagascar.

Musæus, one of the ancient mythical poets, seers, and priests of the Greeks, is said to have been the son of Eumolpus and Selene, or, according to others, the son and pupil of Orpheus. He was the reputed author of a number of poems, oracles, purificatory verses, hymns, &c., of which we possess but a few fragments, and those of doubtful authenticity.—A later Musæus, who flourished about the end of the 5th century, was the author of a beautiful little poem in Greek, entitled *Hero and Leander* (ed. by Aldus Manutius *c.* 1494; by Dilthey, Bonn, 1874). See HERO.

Musa Ibn Nosair (born 640), the Arab conqueror of northern Africa (699–709) and of Spain (712), fell under the displeasure of the Calif of Damascus, and died in poverty in Hedjaz in 717.

Musaeus, JOHANN KARL AUGUST, a German writer, born on 29th March 1735, at Jena, where he studied theology. In 1763 he was appointed tutor to the pages at the ducal court of Weimar, and in 1770 became professor at the gymnasium. His first production in 1760 was a parody of Richardson's *Sir Charles Grandison*, a book at that time extravagantly admired in Germany. Eighteen years later he satirised Lavater in *Physiognomische Reisen*. But his literary fame rests upon his version of *Volksmärchen der Deutschen*, which professed to be a collection of popular tales noted down from the lips of old people; but such is not exactly the case: their chief note is an artificial naïveté. Nevertheless, they are tinctured with such a blending of satirical humour, quaint fancy, and graceful writing that they have become a classic of their kind. He continued to work the satirical vein in *Freund Heins Erscheinungen in Holbeins Manier* (1785), and began a course of tales, *Straussfedern* (1787), which he did not live to complete, dying at Weimar, 28th October 1787. See Life by M. Müller (1867) and Ad. Stern in *Allgemeine Zeitung* (1887).

Muscæ Volitantes is the term applied to ocular spectra, which appear like flies on the wing, or floating black spots before the eyes. There are two kinds of muscæ volitantes—the one a perfectly harmless kind, while the other is symptomatic of serious disease of the eyes. Whoever will look through a minute pin-hole in a card at the clear sky may see floating before his sight a number of translucent tubes or fibres, and many little beads, of which some are separate, some attached to the tubes, and some apparently within them. Some of the tubes or fibres are straight, others looped or twisted, and others again forked. All these objects are bright in the middle, and bounded by fine black lines, beyond and parallel to which may be seen an appearance of coloured lines or fringes. The doublings and crossings of the loops or knots in the twisted fibres appear as black points. Though the eye be fixed, these bodies change their position with greater or less rapidity. These appearances are produced by the shadows of minute corpuscles and fibres present in the vitreous humour. They are not generally noticed under ordinary conditions; but some persons, especially those who have small pupils or who are short-sighted, readily see them, especially on looking at a bright surface, such as a white cloud or a brightly-illuminated sheet of paper. If attended to and watched they become more prominent, and may cause a good deal of annoyance. When they become visible and troublesome under ordinary conditions they generally indicate some defective state of health, particularly of the digestive organs. The appearance of dark spots before the eyes not answering to the above description generally points to the existence of a diseased condition of the deeper parts of the eye, vitreous humour, retina or choroid: and as these, or the morbid conditions causing them, are almost always visible with the ophthalmoscope, the eyes should be thoroughly examined in any doubtful case (see EYE, OPHTHALMOSCOPE). For further information on the differences between the innocent and the dangerous

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forms of muscæ volitantes, the reader is referred to an article by Sir David Brewster in the *North British Review* for November 1856.

Muscardine, or SILKWORM ROT (*Botrytis Bassiana*, so called from the Italian physician Bassi, who first proved its true nature in 1836), is a mould doubtless belonging to the Disconiycetes (since its congener *B. cinerea* has been shown to be the spore-bearing phase of *Peziza Fückeliana*). It was first observed on the silkworm in Piedmont and France in the later part of the 18th century, and was frequently epidemic during the first half of the 19th, but has since been practically stamped out. De Bary has shown that it occurs not unfrequently upon a variety of insects.

Muscat, or more correctly MASKAT, capital of the independent state of Oman or Muscat, which occupies the eastern continuation of Arabia. It stands in a narrow rocky cove that opens out to the Indian Ocean on the one side and on the other forms the exit of a pass leading from the interior of Arabia. It is surrounded by a wall, and defended by forts planted on the rocky heights above. Its streets are narrow and not over clean; in summer the heat is intense; hence Muscat is not a healthy place. Yet the advantages of its situation make it of great importance for the commerce between eastern Arabia, Persia, India, the west coast of Africa, and the Red Sea. Its total trade reaches the value of £1,100,000 annually, the chief exports being pearls and fish, in which its coastal waters are extraordinarily rich, and salt, dates, drugs, dyestuff, horses, and the imports chiefly coffee, rice, sugar, piece-goods, oil, &c. Pop. about 20,000. Although a very ancient place, Muscat remained small and of little importance until the Portuguese took possession of it in 1508. Under their rule, lasting exactly a century and a half, it developed into a prosperous commercial centre. It was subsequently governed by native rulers (*imams*), who in the 17th century succeeded the Portuguese also as masters of Zanzibar and some places on the east coast of Africa. These African possessions were, however, wrested from the reigning imam of Muscat by an illegitimate son in 1856.

Muscatel (Ital. *moscado*, 'musk'), the name given to many sweet, strong French and Italian wines, whether white or red. Amongst the finest are the white Rivesaltes and red Bagnol from Roussillon, and the Lunel from the Pyrenees, the Lacrymæ Christi of Naples, &c. Fine varieties are yielded by Syracuse, Sardinia, the Cape, Canary Islands, Corfu, Crete, and Cyprus.

Muscatine, capital of Muscatine county, Iowa, is on the west bank of the Mississippi, built mostly on rocky bluffs, where the river makes a great bend to the south, 211 miles by rail WSW. of Chicago. It has a large trade by river and rail, and contains great pork-packing establishments, as well as flour and lumber mills, and plough and furniture factories. Pop. (1890) 11,345.

Muschelkalk (Ger., 'shell-lime'), the middle member of the Triassic system as developed in Germany. It is wanting in Britain. The muschelkalk consists chiefly of limestone—the series attaining a thickness of 550 to 1100 feet. The upper portion is more or less pure limestone and highly fossiliferous; the middle and lower portions consist mostly of dolomitic limestone, with which are associated rock-salt, gypsum, and anhydrite. One of the most abundant and characteristic fossils of the muschelkalk is the lily encrinite (*Encrinurus liliiformis*). See TRIASSIC SYSTEM.

Muscle, the fleshy parts of an animal. Muscular tissue is specially distinguished by its power of contracting in one direction, and is the instrument by which all the sensible movements of the animal body are performed. When examined under a high magnifying power the fibres of which it is composed are found to exist under two forms, which can be distinguished from one another by the presence or absence of very close and minute transverse bars or stripes. The fibres of the *voluntary* muscles—those whose movements can be influenced by nerve impulses originated by the will—as well as the fibres of the heart, are *striped;* while those of the *involuntary* muscles, such as the muscular fibres of the intestinal canal, of Blood-vessels (q.v.), and in skin, are *unstriped.*

On examining an ordinary voluntary muscle with the naked eye, we observe that it presents a fibrous appearance, and that the fibres are arranged with great regularity in the direction in which the muscle is to act or contract. On closer examination

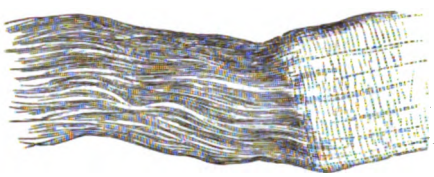

Fig. 1.—Attachment of Tendon to Muscular Fibre in the Skate.

it is found that these fibres are arranged in *fasciculi,* or bundles of various sizes, enclosed in sheaths of areolar tissue, by which they are at the same time connected with and isolated from those adjoining them; and when the smallest *fasciculus* visible to the naked eye is examined with the microscope it is seen to consist of a number of cylindrical fibres lying in a parallel direction, and closely bound together. These fibres may end in blunt extremities or be forked as in the lips, or branched as in the tongue. Each fibre consists of an elastic homogeneous sheath—the *sarcolemma* (Gr. *sarx*, 'flesh,' and *lemma*, 'a skin or husk'), which contains a contractile semi-fluid material. This substance shows transverse striæ at regular intervals, as well as longitudinal striæ. Dilute mineral acids cause the fibre to cleave crosswise into discs. When

Fig. 2.—Sarcolemma of Mammalian Muscle.

Fig. 3.—Muscular Fibre of Frog's Tongue—mag. 200 diameters (after Kölliker).

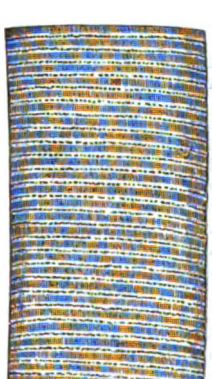

Fig. 4.—Portion of Human Muscular Fibre—mag. 600 diameters.

highly magnified the transverse striæ resolve them-

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selves into (1) a thin dim disc whose edges appear to adhere to the sarcolemma, (2) a clear space, (3) a broad dim disc, (4) a clear space like 2, (5) another disc like 1, &c.

Nerve fibres pierce the sarcolemma, and end upon the contractile substance (see NERVOUS SYSTEM). No blood-vessels penetrate the sarcolemma; they merely lie in the intervals between the fibres. Through the medium of tendon or aponeurosis the muscular fibres are attached to the parts which they are intended to move. Aggregated in parallel series, of greater or lesser size, and associated with nerves, vessels, tendinous structures, &c., they form the various muscles, which are for the most part solid and elongated, but are sometimes expanded (as in the diaphragm) into a membranous shape. In the human subject voluntary muscles are red, and although pale fibres are scattered through many of them, still nothing is ever seen to correspond with what may be found in the muscles of the rabbit. The colour is due to a substance closely akin to the blood-pigment. Each muscle has a middle portion or *belly* and two extremities which are attached. When the belly contracts it acts in a straight line, and drags equally on both extremities; but, as one is more fixed than the other, the force is spent in bringing the movable attachment nearer to the fixed one, and thus the fixed end is named the *origin*, the movable end the *insertion*. Muscles are usually grouped around joints, and attached to bone.

Fig. 5. Muscular Fibre-cells from the coat of the Small Intestine (after Quain): *a*, complete cell showing nucleus, intranuclear network and longitudinal fibrillation; *b*, cell broken in process of isolation.

The *involuntary* or *unstriped* muscular tissue most commonly occurs in the shape of flattened bands of considerable length, but of a width not exceeding $\frac{1}{2000}$th or $\frac{1}{3000}$th of an inch. Their substance presents fine longitudinal markings, and each cell possesses an elongated nucleus, towards each end of which a few fine granules are found. Kölliker has shown that every one of these bands or fibres is either a single elongated cell (a fibre-cell) or is a fasciculus of such cells (see CELL). These fibres have not usually fixed points of attachment like the striated fibres, but form continuous investments around cavities within the body, such as the intestinal canal, the blood-vessels; or are dispersed through the substance of tissues, such as the skin, to which they impart a contractile property.

Cardiac muscle, although involuntary, differs in a remarkable manner from the fibres just described. It consists of quadrangular cells, which are often branched at their ends. Each cell has a clear oval nucleus near its centre, and the cells present transverse striæ not so distinct and less regular than those of voluntary muscle. Hitherto these cardiac fibres have not been shown to possess a sarcolemma.

The chemical composition of ordinary or voluntary muscle is described at FLESH. The fibrillæ, or the sarcous elements of which they are composed, consist of a substance termed Syntonin (q.v.), which closely resembles the fibrine or coagulating constituent of the blood; and the same syntonin is also the main constituent of the unstriped muscles, or at all events of their fibre-cells. Like the blood-fibrine, it exists in a fluid form in the living tissue, and only coagulates or solidifies after death.

Muscles vary extremely in their form. In the limbs they are usually of considerable length, surrounding the bones and forming an important protection to the joints; while in the trunk they are flattened and broad, and contribute very essentially to form the walls of the cavities which they enclose. Muscles derive their names variously (1) from their situation—as the temporal, pectorals, glutæals; or (2) from their direction—as the rectus, obliquus, &c., of which there may be several pairs—as, for example, rectus femoris, rectus capitis; or (3) from their uses—as the masseter, the various flexors, extensors; or (4) from their shape—as the deltoid, trapezius, rhomboid; or (5) from the number of their divisions—as the biceps and triceps; or (6) from their points of attachment—as the sterno-cleido-mastoid, the sterno-thyroid.

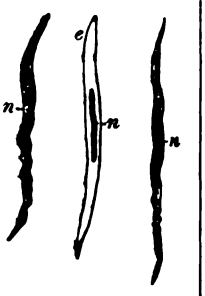

Fig. 6. — Muscular Fibre-cells from Human Artery (after Kölliker): *n*, nucleus; *e*, cell treated with acetic acid.

The skeleton, which may be termed the locomotive framework, may be regarded as a series of levers, of which the fulcrum is, for the most part, in a joint—viz. at one extremity of a bone—the resistance (or weight) at the further end, and the force (or muscle) in the intermediate portion. In most cases, in order to preserve the necessary form of the body, muscles are applied at a great mechanical disadvantage as regards the exercise of their power; that is to say, a much larger force is employed than would suffice, if differently applied, to overcome the resistance. The two main sources of this disadvantage lie in the obliquity of the insertion, and consequently of the action of most muscles, and in the muscles being usually inserted very near the fulcrum. The first of these disadvantages is in many cases diminished by the enlargements of the bones at the joints. See fig. 8, A. The tendons (*t*) of the muscles (*m*) situated above the joint are usually inserted immediately below the bony enlargement, and thus reach the bone that is to be moved (*o*) in a direction somewhat approaching the perpendicular. If this enlargement did not exist (as in fig. 8, B), the contraction of the muscle, instead of causing the lower bone to turn upon the upper one with comparatively little loss of power, would do little more than cause the two ends of the bones to press upon each other. The second mechanical disadvantage is compensated for by gain in the extent and velocity of movement, and by the avoidance of the great inconvenience of having the muscles extended in straight lines between the ends of jointed continuous levers. Thus, the bones of the forearm (fig. 9, *b*, *c*) are bent upon the bone of the arm (*a*) by the biceps muscle (*d*), which arises close to the head of the latter, and is inserted at *e*, at a short distance from the elbow-joint, which acts as the fulcrum of the lever (*c*). By

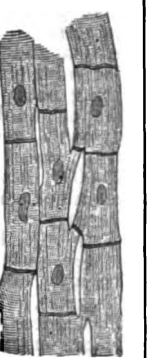

Fig. 7.—Muscular Fibres from the Heart.

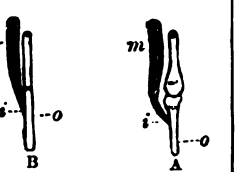

Fig. 8.

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this arrangement a contraction of a single inch in the muscle moves the hand (*f*), in the same time, through the extent of about 12 inches, but then the hand moves through every inch with only about the twelfth part of the power exerted by the muscle. By the junction of two or more levers in one direction, as in the different segments of the extremities, the extent and velocity of their united actions are communicated to the extreme one.

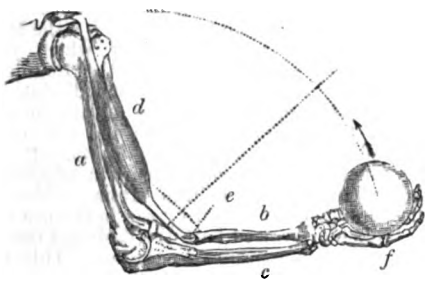

Fig. 9.

Thus, a blow of the fist may be made to include the force of all the muscles engaged in extending the shoulder, elbow, and wrist.

The great and characteristic property of muscular tissue—that of shortening itself in a particular direction when stimulated—is called *contractility*. The stimulus may be direct irritation by mechanical means, or by galvanism, or by some chemical substance, but in the living body the muscular fibres are, in most cases, made to contract by the immediate influence of the nerves distributed among them, which are consequently termed *motor* nerves (see NERVOUS SYSTEM), and are under the influence of the will. By an exertion of volition, we can contract more or fewer muscles at once, and to any degree, within certain limits; and, as a matter of fact, there is hardly any ordinary movement performed in which several muscles are not called into play. But every voluntary muscle is also subject to other influences more powerful in their operation than the will. The movement of the features under the impulses of passion and emotion are more or less involuntary, as is shown by the very partial power the will has of restraining them, and the extreme difficulty of imitating them. Many movements ensue involuntarily when certain impressions, which need not necessarily be attended with consciousness, are made on the surface of the body, or on any part of its interior, either by external or internal causes. Such movements are termed *reflex*, and are noticed in the article NERVOUS SYSTEM. For various important groups of muscles, see ARM, EYE, FOOT, HAND, KNEE, LEG, &c.; and for the source of muscular force, see DIET, DIGESTION.

Muscovite. See MICA.

Muscovy. See RUSSIA.

Muses, in the Greek Mythology, divinities originally included amongst the Nymphs, but afterwards regarded as quite distinct from them. To them was ascribed the power of inspiring song, and poets and musicians were therefore regarded as their pupils and favourites. They were first honoured amongst the Thracians, and, as Pieria around Olympus was the original seat of that people, it came to be considered as the native country of the Muses, who were therefore called *Pierides*. In the earliest period their number was three, though Homer sometimes speaks of a single muse, and once, at least, alludes to nine. This last is the number given by Hesiod in his *Theogony*, who also mentions their names—Clio, the muse of history; Euterpe, of lyric poetry; Thalia, of comedy; Melpomene, of tragedy; Terpsichore, of choral dance and song; Erato, of erotic poetry; Polyhymnia, of the sublime hymn; Urania, of astronomy; and Calliope, of epic poetry. Their origin is differently given, but the most widely-spread account represented them as the daughters of Zeus and Mnemosyne. Homer speaks of them as the goddesses of song, and as dwelling on the summit of Olympus. They are also often represented as the companions of Apollo, and as singing while he played upon the lyre at the banquets of the Immortals. Various legends ascribed to them victories in musical competitions, particularly over the Sirens. In the later classic times particular provinces were assigned to them in connection with different departments of literature, science, and the fine arts; but the invocations addressed to them appear to have been, as in the case of modern writers, merely formal imitations of the early poets. Their worship amongst the Romans was a mere imitation of the Greeks, and never became truly national or popular. Among the places sacred to them were the fountains of Aganippe and Hippocrene on Mount Helicon, and the Castalian spring on Mount Parnassus.

Museum (Gr. *mouseion*), originally the name given by the ancients to a temple of the Muses, and afterwards to a building devoted to science, learning, and the fine arts. The first museum of this kind was the celebrated Alexandrian Museum—a meeting-place for learned men and a library, founded about 280 B.C. in the palace. After the revival of learning in Europe the term museum came to be applied to collections of antiquities, and sculptures, and paintings. Collections illustrative of natural history and other sciences now form a chief part of the treasures of many of the greatest museums, and there are museums devoted to particular branches of science, and to illustrating the industrial arts. Of the museums of Britain, the British Museum (q.v.) and that of South Kensington (see KENSINGTON) are the most important. The museums of the Vatican in Rome, of the Louvre in Paris, of St Petersburg, Dresden, Vienna, Munich, and Berlin, and the National Museum at Washington also are among the greatest in the world. See the Address of the President of the British Association, 1889.

Musha Islands. See OBOK.

Mushroom, or AGARIC, the popular name of a somewhat diverse group of genera and species of fungi belonging to the sub-order Hymenomycetes, of the great class Cryptogams. The best known of the true mushrooms to English readers is the Common Mushroom (*Agaricus campestris*), and it is the type of the sub-order named. In Britain it is the most esteemed of its tribe, though little valued in countries where fungi more generally form an article of diet of the people; in Italy it is disapproved. It should be noted that some of the forms common to Europe and North America are esteemed in England, but found unpalatable in the United States. The Common Mushroom varies considerably in appearance according to soil and locality, but presents in all its variations the same essential characters. It has a fleshy head or *pileus*, smooth or scaly on the upper surface, varying in colour from white to different shades of tawny or fuliginous brown. The gills (*hymenium*) on the under side of the head are free, at first pallid, changing by gradations in age to pink, purple, and brown-black. The stem is white, varied in shape, full, firm, furnished towards the top with a white persistent ring. The Common Mushroom is widely

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distributed in most of the temperate regions of both the northern and the southern hemispheres. In Britain it is abundant chiefly in autumn in pastures and orchards.—The Horse Mushroom (*A. arvensis*) is very frequently found growing in company with the Common Mushroom. It is altogether

Fig. 1.

1. Parasol Agaric (*Agaricus procerus*); *a*, young. 2. Orange-milked Agaric (*A. deliciosus*); *b*, young. 3. White Field Agaric (*A. virgineus*); *c*, young.

a coarser and larger form, and is less favoured for culinary purposes except in the making of ketchup. It often attains enormous dimensions; the top is generally smooth and snow-white, gills brownish white, ultimately with age becoming brown-black, stem pithy or hollow, with a ragged or floccose ring. This is the 'White-caps' Mushroom of some parts of England.—The true St George's Mushroom (*A. gambosus* of some, or *primulosus* of others), so called from appearing about St George's day (April 23), is sometimes confounded with the Common Mushroom. The head is thick and fleshy, at first convex, becoming undulated and irregular in outline, light yellow in colour in the centre, fading to opaque white at the edges, gills yellowish white, irregularly interposed, smaller and larger, overlying each other like the plaits of a frill; the stem is solid, white, when young bulging at the base, but in age either equal throughout or tapering to greater thickness above. The skin of this mushroom is soft and firm to the touch, and in appearance has been aptly described by Berkeley as resembling a cracknel biscuit. It is one of the most prized of the Agarics on the Continent, so much so in Rome that a dish of it is considered the most fitting present to any one whose good offices are to be propitiated.—The Fairy-ring Mushroom (*A. oreades; Marasmius oreades* of some), also the Champignon of the French, is common in pastures and in lawns in Britain, and in most parts of Europe. The head is small, smooth, fleshy, convex, having a boss (*umbo*) in the centre, tough, leathery, elastic, wrinkled; when soaked with water brown, when dry buff. The gills are free, distant, somewhat paler than the head; the stem equal in thickness, twisted, tough, fibrous, of a pale silky-white colour. This species is much esteemed by all who know it. Its flavour is extremely fine, and it is employed in the making of the best kinds of ketchup. On the Continent it is dried and used in the form of a powder to flavour various made dishes. Its peculiar mode of growing in circular patches or in rings, which procured for it its popular name, leads to the risk of an allied but poisonous species which sometimes grows in the same manner being confounded with it. This is the False Champignon (*A.* or *Marasmius urens*), which is readily distinguished from the true Fairy-ring Mushroom by its having a flat top without any boss, and by its narrow gills being closely crowded together. The foregoing are the most commonly esteemed of edible British mushrooms. But there are a number of others which are not only wholesome but extremely delicate in flavour and nutritious. There is the Parasol Mushroom (*A. procerus*); the Maned Mushroom (*Coprinus comatus*), of which young specimens only should be used; the Red-fleshed Mushroom (*A. rubescens*); the Clouded Mushroom (*A. nebularis*), appearing late in autumn in moist places on the borders of woods; and the Orange-milk Mushroom (*Lactarius* or *A. deliciosus*). This last is much prized by connoisseurs in edible fungi on the Continent and in Britain. It has, as the name implies, orange-coloured milky sap in the head, and when broken or bruised both the flesh and the milk become green by exposure to the air. This is an

Fig. 2.

4. St George's Agaric (*Agaricus georgii*); *d*, young. 5. Common Mushroom (*A. campestris*); *e*, young. 6. Fairy-ring Mushroom (*A. oreades*); *f*, young. 7. *Clavaria phalloides*; *g*, young.

excellent test when there is any doubt as to the identity of this and an allied but virulently poisonous species—*L. torminosus*—in which both the flesh and the milk are white, and do not change colour when broken or bruised. Although many of the British fungi are wholesome and nutritious food, yet it is proper that the inexperienced in diagnosing them should be cautioned strongly against eating any species of the wholesome qualities of which they are not absolutely assured. In many continental cities inspectors are appointed to examine all fungi that are brought to market, lest deleterious species should perchance be sold to the people. Those who desire to acquire an accurate knowledge of edible British species of fungi may refer to Dr Badman's *Esculent Funguses* (1863), M. J. Berkeley's *Outlines of British Fungology* (1860), and other works cited at FUNGI.

The culture of the common mushroom for profit in Britain has since 1875 become an important branch of gardening industry. About London in particular it is entered into by market-gardeners and even by specialists who live and thrive solely by the production of mushrooms for the million. To a lesser extent the industry is also

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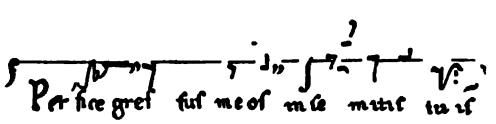
being taken up in the vicinity of the larger provincial towns. In Paris the catacombs are utilised for the growing of mushrooms, as are caves in all parts of France; and in Edinburgh the disused Scotland Street tunnel was acquired in 1886 for the same purpose. The principles of the culture of mushrooms are very simple, though considerable attention and skill are required in working out the practical details. For these, see W. Robinson's *Mushroom Culture* (1880).

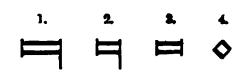
Music. European music is by no means a spontaneous expression of ideas and sentiments, and it is only in a poetical sense that we can talk of the 'music' or 'melody' made, for example, by birds. Music is an art, and in order to make an impression on our minds it must take as its foundation the succession of sounds embodied in the scales we have chosen, and to which we are accustomed; it must also conform to the rules which have become the canon of music. We must look for its birth in Egypt, but it would serve no purpose here to occupy any space with the little that is known of Egyptian, or its offspring Greek music.

It is not improbable that the Israelites took with them to Palestine some songs they had learned in Egypt; and that many of the hymns of the early Christian church were identical with Temple melodies. As from these hymns was formulated the first authoritative musical system, we may say that in a double sense we are indebted to Egypt for the beginning of the modern art. It was St Ambrose towards the close of the 4th century, and Gregory the Great two centuries afterwards,



Neume Notation of the Tenth Century.

who selected eight scales or 'modes' (the 'Gregorian') as proper for use in church music (see HARMONY), and till about 1600 A.D. the legitimate development of music was in the hands of the clergy. At first a rude system of dots and scratches (*neumes*) above the syllables in the Rubric served to indicate approximately when and how far the voice should be raised or lowered in pitch. This could only have been an aid to memory. The relative pitch of the notes was more definitely shown when a line of normal pitch was drawn through these neumes; and to this line was added three others in order to attain a more exact definition of intervals. The key or clef (*clavis*) was given to this stave of lines by a sign—usually 𝄡 or 𝄢 on the line which represented that note (C); sometimes F (𝄢). Later the G (𝄞) clef came into use, of which our treble or violin Clef (q.v.) is a corruption. With the idea of singing in parts instead of unison came the necessity for indicating the relative *duration* of notes as well as their pitch, and for this purpose different shapes were given to the [*Nota*] *Longa* (2)—the *Maxima* (1) being twice as long — and to the *Brevis* (3) with its supplementary *Semibrevis* (4). A very short note was added—the *Minima* (5). When music came to be printed these signs were made open, and convenience in writing substituted the round form for the square or diamond. The semibreve (𝅝) is now our longest note, although the breve is still to be met in church music, and in the indication of the measure 'two semibreves to the bar' (*Alla Breve*). In order to avoid a certain false relation of sound called the *tritonus*, which the pious old theorists called 'the very devil' ('Mi contra fa diabolus est in musica'), some of the church modes used B♭ instead of B. This was the only 'license' allowed, and was indicated by the 'B rotundum' (♮) instead of the 'B quadratum' (♭). These signs are the origin of our 'accidentals'—the flat (♭), which lowers the pitch of a note one semitone, and the natural (♮), which restores it. The sharp (♯), which raises the pitch, is also a development of the 'B quadratum.' See also GUIDO ARETINUS.



Counterpoint (1400–1600 A.D.).—Such were the materials with which Johannes Ockenheim or Okeghem (*c.* 1420–1513) and Josquin des Prés (*c.* 1450–1521) laid the foundation of Counterpoint (*punctus contra punctum*, 'note against note'), the art of combining one or more melodic parts with a principal melody called the 'Canto Fermo,' or fixed song. Counterpoint was the workshop in which were made many of the best tools used by great musicians of modern times. The art attained its perfection under Orlando di Lasso and Palestrina at the end of the 16th century, just when a new departure by Monteverde became the inauguration of the new school of harmony which was to supersede the old contrapuntal school by assimilating all that was good therein. Other influences which helped to break the monopoly of church counterpoint were the growing popularity and secularity of Madrigals (q.v.), at first distinguishable only by their words from church music; the improvement in organ-building and organ-playing, which encouraged freer part-writing and bolder melodic progressions than the limitations of unsupported human voices allowed; and doubtless also the natural warmth of musical feeling which had found expression among the troubadours of France and the minnesingers of Germany, and in the rude popular songs of these early ages.

Florence Academy.—Most potent factor of all in this new birth of music was the invention (in 1584–1600) of recitative music and the introduction of the dramatic principle by the Florence Academy —a group of literati and artists who met in the house of Count Bardi, a Florentine nobleman. Their aim and ambition was to restore the ancient accompanied Greek play; and by making use of all the slender resources which harmony could then put at their disposal they stumbled, as it were by accident, on the form of recitative, or, as they called it, 'Stilo rappresentativo.' The development of opera and oratorio, with all the various forms of aria, &c., was a natural consequent, a particular account of which will be found under their proper headings.

Monteverde.—The great landmark which separates the old school of counterpoint from the new is the compositions of Monteverde, whose importance is explained in the article on Harmony. It was only gradually that the new leaven spread through the schools of Europe, and nearly one hundred years elapsed between the setting of Palestrina's sun and the appearance of the twin morning-stars of modern music—Bach and Handel. The time, however, was well occupied. In vocal music greater freedom in the use of established forms was gradually attained, and new forms were invented, chief among which was the Aria introduced by Alessandro Scarlatti (1659–1725). He first used the 'second part,' which, followed by a *da capo* or repetition of the first strain, summarised for vocal music the tendency which was dominating all musical development.

The French Grand Opera school, founded by the Florentine Lully (1633–87), studied the art of

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expressing in sound the most fleeting emotions to be found even in the ever-varying turns of thought in an operatic recitative.

Of still more importance was the progress made during the century in instrumental music. A great impetus to solo-playing in particular, and execution in general, was given by the improvement in the manufacture of violins. The centre of this industry was Cremona, where the three famous families of Straduarius, Guarnerius, and Amati worked for three generations. Some of their instruments are to-day literally worth more than their weight in gold.

Handel and Bach.—In 1685, on the 23d of February and 18th of March respectively, were born Handel in Halle and Bach in Eisenach. From 1710 till 1739 Handel devoted all his energies and genius to writing operas after the Italian school, and most of his works have shared the fate of their contemporaries and rivals. He was then led into the path of oratorio, and a brilliant succession of well-known compositions sheds an undying radiance on the last twenty years of his active life (see ORATORIO). Bach's influence has been wider and more far-reaching even than that of his great contemporary. Indeed, no less a critical authority than Schumann has declared that music owes as much to Bach as Christianity does to its founder. By virtue of his complete and easy command of all the resources of harmony and counterpoint, his boundless originality and fertility, the invariably high level of his compositions—even when judged by his own high standard—he takes a place above all ancient and modern composers. Under his influence also the German school of composition chose the path of instrumental music, in which the voice is only one of a large orchestra of instruments, entitled to no more consideration than its limits demand. The attempt in Gluck's operas to reconcile the requirements of expressive instrumentation and the demands of the vocal school was more successful in theory than in reality (see GLUCK), and the true central column of progress has moved up till now in Germany along instrumental lines in the hands of Bach, Mozart, Beethoven, Schumann, Wagner, and their contemporaries.

Sonata.—The most important form of instrumental music had hitherto been the Fugue (q.v.), and in its strait and heavy harness these giants of old moved with ease, grace, and dignity. But the age of monothematic work was already past, and the old dance forms (allemande, courante, sarabande, gavotte, gigue) did not readily lend themselves to the requirements of thematic development, so necessary to instrumental music as a conception distinct from music, to which words at once give inspiration and impose limitation. Corelli, A. and D. Scarlatti, Bach, and others each strove to solve the problem in his own way, and the sum of their influences was handed from Emmanuel Bach to the 'formulator of the modern sonata,' Joseph Haydn (1732–1809).

The name 'sonata' was first used in Italy for music which was only to be played or 'sounded,' contrasted with 'cantata,' which was to be sung. The particular form, however, gradually separated itself from all other instrumental music, and when generations of earnest musicians had lavished care, thought, and experience on its development it was accepted, and is accepted, as *the* form *par excellence*. In its mould are cast sonatas, symphonies, quartetts, concertos, &c., and even the most romantic and daring of fantasias find it necessary to recognise its broad and accommodating principles. Haydn's sonatas are still very formal; so also are Mozart's, though he had more in common with the Romantic school of the next century than the elder composer. This is shown by a comparison of their symphonies. Haydn's are beautiful and graceful, but the themes and subjects he chooses are never very deep, nor can they move the depths of the heart. He is most successful in his airy and humorous quick movements. In Mozart's symphonies a nobler and more romantic spirit breathes—sometimes with most intense passion, sometimes with a dignified melancholy. And so the way was prepared for the most powerful and the most widely honoured of all rulers in the realms of sound. In the works which are classed as his 'first period' Beethoven showed how he had studied and mastered the work of his great predecessors. In his second period he proceeded to build on the solid foundation that wonderful structure to which the vast conceptions of his third period form a fitting and glorious crown. Nothing important has been added to sonata form since Beethoven wrote the works between the *Eroica* and the Choral Symphonies (1803–23); and although much has since been written, much that is new, much that is original—although a ready appreciation is granted to the passion of Schumann, the romantic power of Schubert, the poetry of Chopin, the refined elegance of Mendelssohn, the successful use of new colour shown in later works by Brahms, Dvorák, Liszt, &c.—Beethoven's sonatas and symphonies still stand unrivalled, unchallenged.

Fantasia.—A desire for some more direct, more unfettered expression of feeling not unnaturally succeeded this long striving after adequate form. But, while all great composers devoted most of their genius to its development of perfect form, the growth of the fantasia was much neglected. Only when the greatest minds turned their attention for a moment from the more important aim was anything of lasting importance produced; and that because it is only the mind trained in the strict school of form to use all available resources which can wisely enjoy a liberty so easily converted into license. The earliest attempts in fantasia form were called 'toccatas' during the 17th century; and, notwithstanding excellent modern toccatas by Schumann, Rheinberger, and others, we may say that the history of the toccata was brought to a close by the magnificent specimens written early in the 18th century by J. S. Bach. The same composer left a freer model than the somewhat formal toccata in one of the most famous and successful fantasias in existence, and instrumental music has never attained nearer to the definiteness of articulate speech than in the great *Chromatic Fantasia*.

The strong romantic movement which naturally ensued after the perfecting of the classical school in Beethoven's hands eagerly followed out the path he so often and with such effect indicated in his works; and, although the name fantasia has lately fallen into much disrepute by reason of many unworthy and worthless compositions, it may recover its fair fame when Schumann's and Schubert's fantasias have survived their contemporaries. In any case the endless varieties of fantasia (i.e. unfettered) form, and their adoption in rhapsodies, symphonic poems, and the like, have proved as valuable and as potent a factor in modern romantic music as the various modifications they have effected in the classical sonata form (e.g. Liszt's concertos and sonatas). Schumann adopted some very curious whimsical or poetical names for his smaller compositions—novelette, humoreske, carneval, &c.—and the idea has found great favour with many modern writers. The nocturne invented by the Irish pianist Field is more identified with Chopin's dreamy genius. The latter composer also transfused the waltz and the polonaise and mazurka of his own unhappy country with such an intensity of passion, such a chivalrous

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nobility, and surrounded them with such a halo of poetry and romance that they are an important addition to the resources of a modern composer, and Chopin's name overshadows that of Schubert and Weber, earlier workers in the same field (*Deutsche Tänze, L'Invitation à la Valse*). The latest developments in instrumental music are intense nationality in colour and thought, as shown in the works of Grieg, Dvorák, Liszt, Mackenzie, and a new striving after more definiteness which was inaugurated by Berlioz.

Vocal Music.—The progress of vocal music from its first great triumph in 16th-century counterpoint was much slower and varied than that of instrumental. The reason of this is not hard to find; for the conception of vocal writing in the contrapuntal school was sound and artistic, and it reached a point of absolute perfection in that epoch called the 'Golden Age.' Thus there was not the necessity for that advance which ever improving instruments and the feeling for instrumental effects demanded. Indeed, in choral music exactly the same principles which formulated the rules of counterpoint in the 16th century, must be recognised by composers of to-day who wish to produce the purest and grandest effects; and the rules themselves have been rather extended in scope than relaxed in meaning by Bach, the most daring choral writer, and his successors. Where the letter of the law has been modified it has been so from within, and the spirit remains the same. It will be convenient here to treat of choral and solo vocal music, leaving the other obvious subdivisions of sacred and secular to be treated in the articles ORATORIO and OPERA.

Monody.—From the invention of part-singing till the end of the 16th century (i.e. during the course of its legitimate development in the church) vocal music was entirely choral. When a solo was required, the most melodious part was selected from a choral movement, with what must have been a most unsatisfactory and incomplete result. The first example of a piece conceived and written for one voice seems to have been *Ugolino*, a dramatic scena with viola accompaniment, written (1584) by Galilei (father of the philosopher), one of the Florence Academy. It was this invention of Monody which prepared the way for opera and made it possible. Unfortunately, the first writers in this new school, which aimed after expressive melody, were little proficient in the more solid art of counterpoint which they affected to despise; and this tendency consistently followed out has procured for Italian music its unenviable reputation of being gracefully melodious at the expense of depth and meaning. The rude recitatives of earlier composers became more and more melodious till A. Scarlatti formulated the first *Aria*—i.e. a regular strain of melody, followed by a second in contrast and complement, and thereafter repeated (*Da Capo*). Almost any of Handel's well-known songs will furnish an advanced specimen of this form, which was brought to perfection by Mozart. The more serious style required for sacred works, as well as the greater skill in the *science* of music which was at the disposal of composers like Handel, Bach, and Mozart, saved the Aria from its friends, and in northern Europe it chose a slower development but a worthier end. In the schools of Bach, Gluck, Beethoven, Schumann, Wagner, and Liszt the voice is treated as only one instrument, to which indeed the important part is assigned of giving the words intended for illustration—the expression, however, being entrusted to the whole mass of instruments employed. The claims of any settled form to absolute consideration are likewise disregarded where these seem to clash with the higher demands of expression and dramatic truth. Hence the opposition offered and the accusations brought against all these composers in succession by the professional and amateur melodists of each day. None of their styles may be entirely exonerated, but their ideal is certainly the true one, and their work shows a progressive development along at least closely related lines.

Ballads.—Alongside this scientific progress there has always been the popular love of melody which has found expression in folk-song and ballads. Each nation has its characteristics strongly reflected in these, and where they have been recognised and accepted as a veritable and refreshing fount of inspiration—as in Germany, Hungary, and Norway—the gain has been great. They are of course the origin of the simple strophic song or ballad (e.g. Mendelssohn's *Es ist bestimmt*), however skilfully modern composers adorn it with graceful accompaniment (e.g. the same composer's *Auf Flügeln des Gesanges*). The Ballade, which aims at a dramatic setting of some romantic story, is the offspring of the same influence which inspired Weber's operas. In this style Loewe showed Schubert the way (*Erl König*), and following composers have used the device very successfully (Villiers Stanford's *La Belle Dame*). A later form is the art song which tries to reflect the most delicate turn of meaning and the deepest subjectivity to be found in the words. It was to a great extent the result of Heine's poetry, and its first great exponent was Schumann.

Choral Music.—The chosen home of modern choral music has been Germany and England. In the beginning of the 17th century H. Schütz left his home in Dresden to study the 'new music' of the Florentine school in Italy, and he took the weakling back with him to be reared among the great instrumental masters of Germany. The noble German chorale was chosen as a foundation, and in the effort to illustrate the text no device of counterpoint, no resource of the ever-improving science of harmony, was left unused. Graun, Bach, Haydn, Handel, Mozart, Beethoven, Mendelssohn have enriched the church with innumerable and inestimable treasures in their Passions, Oratorios, Masses, and Psalms; and it is surprising how well fitted the strict writing of all these masters has proved in their hands to convey the most elevated, the most dramatic, the most touching emotions. More modern works are such as Dvorák's *Stabat Mater*, Liszt's Masses, &c. But the same principle has always commanded the same success; whatever modern development in modern instrumentation, harmony, &c. may be added to a composer's resources, there is only one foundation, that on which the great masters have ever built when rearing their great choral works.

Formal choruses have never been an important part of operatic writing since the first rude beginnings. In plays the single characters will be rather brought together, as it were, than introduced with a distinct intention of giving each an equal part. This feeling for dramatic truth is the origin of the concerted writing in operas—duets, ensembles, finales—the treatment of which is indebted partly to solo vocal writing, partly to choral. The handling of crowds, again, and the best expression in music of their feelings requires different treatment, and it is interesting to compare how each great reformer has approached the problem. Curiously enough, it is the composers who have shown the greatest capacity for many-part writing who have most successfully given the correct impression. No two works are wider asunder than Bach's *Matthew Passion* (1729) and Wagner's *Meistersinger* (1867); and yet it is impossible to deny that the single terrible

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shout of the multitude 'Barabbas!' and the complicated chorus 'Let Him come down from the cross,' show that a genius in no way inferior to Wagner's, but with comparatively very limited resources, could grapple with the same problem which is so marvellously solved in the street riot scene (*Meistersinger*, act ii.). Gluck's correct feeling saw the difficulty, but his powers were not great enough to overcome it. Mozart's greater, and in this matter somewhat irresponsible, genius never troubled itself on the subject.

Orchestra.—It only remains to describe shortly the growth of the orchestra before closing with an account of the latest development in European music. Monteverde laid the foundation of the modern orchestra when he multiplied the stringed instruments and relegated the pianoforte (or rather its precursor the harpsichord) to a somewhat subordinate position. The latter, however, maintained its place in the orchestra till after Handel's day. Between Monteverde and Haydn many experiments were made in the arrangement and combinations of instruments; also in the manufacture of the instruments themselves. By-and-by the various forms of 'Viol' (Viol di Gamba, di Braccia, &c.) resolved themselves into the viola or tenor violin, and the violoncello (i.e. 'the little violone' or smaller double bass). The violin is of course the little viol. And these remain the foundation of our orchestra. The wind-instruments were the flute and the oboe (a compromise among various forms—Oboi d'Amore, di Caccia, &c.), to which the bassoon gave the bass. To these were added trumpets and drums for special effects. Such was the orchestra with which Haydn laid the corner-stone of modern instrumentation. Mozart added the expressive clarinet, which was at once incorporated in the band. The piccolo, or little flute, and the double bassoon (Contra Fagotto) can hardly be called additions in the sense of novelty; and from Mozart's time to Wagner's the improvement, with one important exception, has been in the direction of improvement in mechanism, and in power of variety in combinations and tone colours. The exception is the trombone, first used with its full effect by Mozart in *Don Giovanni*, and ever becoming more important in the hands of Beethoven, Schubert, Schumann, and Wagner. Berlioz, the greatest master of instrumentation the world has seen, embodied the result of his experience in a 'Treatise' which will ever remain one of the greatest monuments of his extraordinary genius. He has been worthily followed by the scarcely less successful Wagner, and an enumeration of the instruments at his masterly disposal will show what limitless combinations and permutations are now possible. In *Tannhäuser*, the orchestra for which he writes comprises, besides the usual stringed band (about 12 first violins, 12 second violins, 8 violas, 8 violoncellos, and 6 double basses), 3 flutes, 1 piccolo, 2 oboes, 2 clarinets, 1 bass clarinet, 2 bassoons, 2 horns, 2 valve horns, 3 trumpets, 3 trombones, and 1 bass tuba, with 1 pair of kettledrums, bass drum, cymbals, triangle, tambourine, and harp; and, on the stage, 4 flutes, 2 piccolos, 4 oboes, 6 corni Inglesi, 6 clarinets, 6 bassoons, 12 trumpets, 12 horns, 4 trombones, cymbals, triangle, and tambourine.

Programme Music.—Many attempts of a more or less legitimate kind have been made to illustrate by abstract music a certain story, set of scenes, or progress of emotions. Probably the earliest examples which can be pronounced artistically successful are the famous Pastoral Symphony and the sonata *Les Adieux, l'Absence, et le Retour*, by Beethoven. To criticise this tendency would lead us far beyond the limits of this article, and a mere enumeration of names and compositions will suffice to show what an attraction the idea has had for almost all modern composers. Mendelssohn has tried to paint Fingal's Cave in his *Hebrides* overture, and in his Scotch Symphony he seeks to convey the impressions made on him during his visit to Scotland. Schumann has painted a whole set of figures and characters in his *Carneval*, and in his great *Fantasia in C* he has set out with a very definite intention to convey the meaning of a verse by the poet Schlegel. Berlioz has gone further and proposed to tell the *Episodes in the Life of an Artist* in a symphony. Unfortunately, his morbid and rather gruesome genius has chosen very repulsive pictures to paint; and he also makes the mistake of entrusting a certain character or sentiment to a certain phrase—evidently impossible without words set to the music or a previous explanation. Raff's *Lenore* Symphony, Mackenzie's *La Belle Dame*, and Liszt's *Mazeppa* are good examples of well-known poems set forth in music alone. MacCunn's *Land of the Mountain and the Flood* is a descriptive overture; and Liszt's and Saint-Saëns' *Symphonic Poems* are very beautiful and expressive.

Of course, descriptive music which occurs in the course of a cantata (e.g. in David's *Le Désert* or Berlioz's *Faust*) has the advantage of a definite starting-point in the words which surround and explain it, and therefore is distinct from these works mentioned which aim at dispensing with words except as an inspiration. The success which has attended the attempts is certainly unequal, but an immense new field of effort has been opened to composers which will doubtless yield a rich harvest.

Whither music is tending in the 19th century it is difficult to say; but so long as the treasures left us by the great composers are as reverently and as earnestly studied and accepted as they are at present: so long as composers recognise that their genius is a call to labour and not to enjoyment: so long as criticism is honest and based upon sound knowledge, there is no fear that the heritage of the ages will be lost. And one delightful feature all over Europe just now is the intense nationality which lovingly studies the national treasures, and, with a skill and a breadth of conception only to be gained in the cosmopolitan school, proudly holds up both them and the æsthetic truths they tell for the admiration of musical Europe.

See the general histories of music by Naumann (Lond. 2 vols. 1882–86), Ritter (1880), Rockstro (1886), Rowbotham (1886), Ambros (Leip. 4 vols., unfinished; 2d ed. 1880–81), Fétis (Paris, 5 vols., unfinished, 1868–76); Marx, *Music of the 19th Century* (2d ed. 1873); Hullah, *Transition Period* (1876), and *Modern Music* (1861; new ed. 1875); and Grove's *Dictionary of Music and Musicians* (4 vols. 1878–89). See also the articles in this work on famous composers and musicians, and on

Accompaniment.	Conservatoire.	Orchestra.
Acoustics.	Cornet.	Organ.
Adagio.	Counterpoint.	Overture.
Andante.	Double Bass.	Piano.
Anthem.	Drum.	Pitch.
Arrangement.	Flute.	Plainsong.
Bagpipe.	Fugue.	Rondo.
Band.	Glee.	Sax-horn.
Banjo.	Harmonica.	Scale.
Bass.	Harmony.	Solfeggio.
Bassoon.	Harp.	Song.
Bugle.	Horn.	Sound.
Catch.	Madrigal.	Symphony.
Cavatina.	National Hymns.	Temperament.
Chant.	Oboe.	Trombone.
Choirs.	Opera.	Trumpet.
Chord.	Ophicleide.	Violin.
Clarinet.	Oratorio.	Violoncello.

Musical Box, a case containing a mechanism which, when the spring is wound up, plays tunes automatically. Teeth projecting from a barrel (as in a barrel-organ or a mechanical peal of chimes) impinge on and set vibrating the tongues cut out

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in *comb* or steel plate; the difference of tone being due to the greater length and breadth of the teeth. The larger and better boxes, some of which play many tunes after one winding up, can be regulated in pace by a fly regulator, with flat wings, which catch the air. The invention dates from about the middle of the 18th century. Switzerland (especially Geneva) is the headquarters of the manufacture.

Musical Glasses. See HARMONICA.

Musk. The musk of commerce, which is an important element in very many compounded perfumes, is mainly obtained from the Musk-deer (q.v.), the best kind being that known as Chinese musk, and imported from Tonquin. Other kinds are the Indian (from the Himalayas) and the Siberian. Musk is often adulterated with dried blood, bits of leather, &c. In 1890 Bauer of Erfurt produced an artificial musk by treating butyl-toluol with a mixture of sulphuric and nitric acids, the resulting nitro-compound being purified by crystallisation from alcohol.

Musk-deer (*Moschus moschiferus*) is a ruminant Ungulate forming a special family of the Artiodactyla. According to Flower, it represents an ancestral type of the Pecora (Bovidæ, Cervidæ, Giraffidæ), but with nearest affinities to the Deer (Cervidæ). As in the Cervidæ, the young is spotted, but it has no horns, and the canine teeth of the male project in the form of longish tusks; this latter fact has led to the association of *Moschus* with the Tragulidæ (Chevrotains, q.v.), which is, however, not justified by its other characters. The musk-deer is an inhabitant of the mountainous regions of central Asia from the extreme north to as far south as Cochin-China and Nepal. There is only one species, with perhaps four well-marked varieties. The musk-deer is much hunted on account of the odoriferous secretion which is found in a special gland upon the hinder-part of the abdomen of the males. This substance was first introduced into the west by the Arabs. It is spoken of in the pharmacologies of Serapion and Avicenna and by the traveller Marco Polo. The value of the substance used to be very great, as it figures among the costly objects presented by Saladin to the Greek emperor in 1189. It was used in the embalming of bodies as early as the 14th century. For an interesting account of the musk-deer (and the Chevrotains), see Milne-Edwards, *Annales des Sciences Naturelles* (1864); and for the anatomy, Flower, *Proc. Zool. Soc.* 1875.

Muske'gon, capital of Muskegon county, Michigan, is on the Muskegon River, which here (4 miles from its mouth in Lake Michigan) widens into Muskegon Lake, the best harbour on the east side of Lake Michigan. Muskegon is 40 miles by rail NW. of Grand Rapids, has daily steamboat communication with Chicago, and saws and ships enormous quantities of lumber. It has also a number of foundries, machine-shops, boiler-works, &c. Pop. (1890) 22,702.

Musket. See FIREARMS.

Musk-glands, skin-pits in mammals producing a secretion with a musky odour. They belong to a series of skin-glands, which occur in various parts of the body and with various secretions (see ANAL GLANDS). The most notable musk-glands are those of the male musk-deer and the male beaver. See BEAVER, CASTOREUM, CIVET, &c.

Musk or Muscovy Duck. See DUCK.

Musk-ox (*Ovibos moschatus*) is a member of the family Bovidæ. It inhabits at present the most northern parts of the American continent north of lat. 60°. Its remains, which have been found in Quaternary deposits of England, Europe, and Siberia, indicate that it had formerly a much wider range. The hair is long, serving of course to protect the animal from the rigour of the climate which prevails in its habitat, and of a brownish colour. The creature measures above 5½ feet from the tip of the nose to the root of the tail, and so approaches in size the smallest Highland cattle. It is gregarious, there being only one or two males to a herd of eighty or a hundred. They brouse on grass, reindeer moss, willow shoots, the Labrador tea-plant, and crowberry bushes. The flesh of the calves and cows, when in condition, is very palatable. Unlike many purely Arctic

Musk-ox (*Ovibos moschatus*).

animals—e.g. the Arctic fox—the hair does not become white at the approach of winter. But it has been suggested that this protective change in coloration is not necessary, since it is an animal which lives in herds; hence it is better for an individual, which has got accidentally separated from its fellows, to regain a position of safety by being able to readily detect the whereabouts of the herd than to trust to escape from carnivorous foes by a resemblance in colour to the surrounding snow.

Musk-plants. Various parts of a number of plants smell more or less strongly of musk. Among these are the common little Musk-plant (see MIMULUS) and the Musk-seed (see HIBISCUS). The musk-tree of Jamaica (*Moschoxylum Swartzii*), belonging to the natural order Meliaceæ, emits from all parts a smell of musk. All parts of *Guarea grandifolia*, another tree of the same order, a native of the West Indies, sometimes called musk-wood, also smells strongly of musk.—The drug called Musk-root or Sambul is the root of a plant of the natural order Umbelliferæ, and is brought from Persia or central Asia; it has a pure musky odour, and is used as a substitute for musk.

Musk-rat, a name applied to several distinct animals. (1) The Desman (*Myogale*), a genus of insectivorous quadrupeds of the Shrew (q.v.) family (Soricidæ), differing from the true Shrews (*Sorex*) in having two very small teeth between the two large incisors of the lower jaw, and the upper incisors flattened and triangular. Behind these incisors are six or seven small teeth (lateral incisors or false canine teeth) and four jagged molars. The muzzle is elongated into a small flexible proboscis, which is constantly in motion. The eyes are very small; there are no external ears; the fur is long, straight, and divergent; the tail long, scaly, and flattened at the sides. All the feet have five toes, fully webbed; and the animals are entirely aquatic, inhabiting lakes and rivers, and making holes in the banks with the entrance from beneath the surface of the water. Only two species are known, one (*M. pyrenaica*), about 8 inches long, with tail as long as the body, a native of the streams of the

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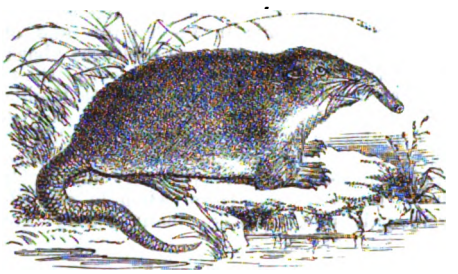
Pyrenees; another larger species (*M. moschata*), very plentiful in the Volga and other rivers and

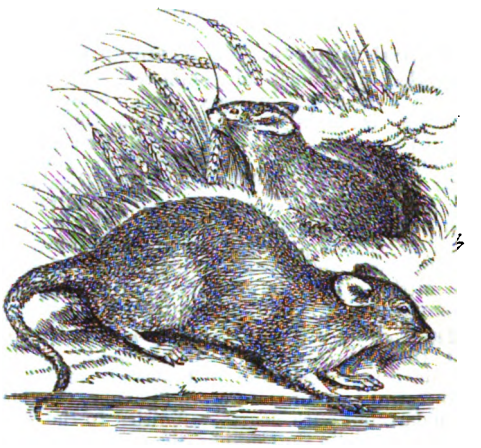


Musk-rat, or Desman (*Myogale pyrenaica*).

lakes of the south of Russia, nearly equal in size to the common hedgehog, with tail about three-fourths of the length of the body. The Russian desman is blackish above, whitish beneath; it has long silky hair, with a softer felt beneath, and its fur is held in some esteem. Desman skins, however, are chiefly valued on account of the musky odour which they long exhale, and which is derived from a fatty secretion produced by small follicles under the tail of the animal. The desman feeds on leeches, aquatic larvæ, &c., searching for them in the mud by means of its flexible proboscis. It seldom, if ever, voluntarily leaves the water, except in the interior of its burrows, which are sometimes 20 feet long. (2) The name of Musk-rat is also a common name for an Indian species of Shrew (*Sorex murinus*), in size about equal to the common brown rat, in form and colour much resembling the common shrew of Britain, but remarkable for the powerful musky odour of a secretion which proceeds from glands on its belly and flanks. (3) The name is also given to the Musquash (q.v.).

Muslin, a fine cotton fabric somewhat resembling Gauze (q.v.) in appearance, but it is woven plain without any looping of the warp threads on the weft. A piece of the finest muslin at one time manufactured at Dacca in India, measuring 3 yards in length by 1 in breadth, weighed only the fifth part of an ounce, and cost £40; but none approaching to this in fineness is made in India now. Very fine muslin has been woven from yarn spun by machinery at Manchester, but it wanted the delicate softness of the finest Dacca. Printed muslins are made in France and England for female summer attire. In India some muslins are woven with coloured patterns; others are embroidered with silk or beetles' wings; others again are printed with gold and silver leaf. Such names as 'woven air' and 'evening dew' are given in that country to those of exquisitely fine texture.

Musquash, also called MUSK-RAT, or ONDATRA (*Fiber zibethicus*), a rodent quadruped, a native of North America, from the Rio Grande to the Arctic regions. The genus to which it belongs contains only one other species, *F. alleni*, from Florida. They belong to the family Muridæ. The musquash is in shape nearly similar to the brown rat; the head and body are about 15 inches in length, the tail 10 inches. The whole body is covered with a short, downy, dark-brown fur, intermixed with longer and coarser hairs. It is a very aquatic animal, seldom wandering from the rivers, lakes, or marshes in which it makes its abode. It is chiefly a vegetable feeder, but like other Muridæ will occasionally take to animal food—the mollusc *Unio* is a favourite delicacy. The fur is in demand, and forms an article of commerce—skins in large numbers being still exported from America to Britain and other European countries. The musquash burrows in the banks of streams and ponds, the entrances of its burrows being always under water. In marshes the musquash builds a kind of hut, collecting coarse grasses and mud, and raising the fabric from 2 to 4 feet above the water. The flesh of the musquash, at those seasons



Musquash (*Fiber zibethicus*).

when it is fat, is in some request among the American Indians, and is said to be not unpalatable.

Mussel, a name applied to several common bivalves or Lamellibranch molluscs. (1) The Common Sea-mussel (*Mytilus edulis*), very important for bait and not unfrequently used as food, is widely distributed in crowded 'beds' between high and low water marks. It is usually sedentary and firmly anchored by yellowish silken 'byssus,' but it is also able to shift its quarters and even to climb by slowly extending the range of the byssal thread exuded from the 'foot.' (2) The Horse-mussel (*Modiolus modiola*) is nearly twice as large as the above, and lives a more active burrowing life below the low-water mark. It is never used for food, and is not available for bait. Both these sea-mussels are representative of large genera, and are included in one family—Mytilidæ. (3) Quite different from the above are the fresh-water mussels, Unionidæ, widely distributed in lakes and rivers, where they plough their way slowly along the bottom from one resting-place to another. As good representatives of the Unionidæ, the Pond-mussel, *Anodon cygnea*, the Painter's Mussel, *Unio pictorum*, whose shells were once used for holding water-colour paints, and the Pearl-mussel, *Margaritana margaritifer* (see PEARL), may be noted. For the structure and general characters, see BIVALVES.

The common edible mussel abounds on the Atlantic seaboard of the United States, but is used neither as food nor as bait. In England it is largely used as human food; in Scotland it is not so used, but enormous quantities are required for bait, especially by haddock fishers. The chief objection to mussels as food is that they are occasionally poisonous. Mussels especially which are unhealthy or dead are very apt to contain dangerously poisonous waste-products; care should accordingly be taken that those used for food are thoroughly fresh. A French Commission reported in 1889 that the poison is due to the presence in the mussel of a volatile alkaloid developed under the influence of a particular microbe, which is only found in mussels growing in stagnant and polluted water. Sewage fairly free from the pollution of manufactories is distinctly

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beneficial to mussel culture. It is said on good authority that mussels lose any poisonous properties they may have if cooked for ten minutes with carbonate of soda. The wasteful and unregulated consumption of mussels from the scalps on the British coasts, the reckless destruction of immature mussels, and the wholly inadequate efforts at artificial mussel culture have caused in some parts of Britain a mussel famine, and necessitated large importations from abroad. Great natural scalps on the British coasts are those of the Wash, Morecambe Bay, and the estuary of the Clyde. The last, from which it is computed that since 1840 one hundred thousand tons of mussels have been taken, is now exhausted and unproductive. The cultivation is practised in the Thames estuary and the Medway, in the Teign and Exe, at Montrose, and elsewhere; but large supplies are imported from Holland. Scotland imports from England, the north of Ireland, and Hamburg. In one year the Eyemouth fishermen have used nine hundred and twenty tons of mussels, mainly imported, and costing £1800. Yet in Lancashire and Norfolk mussels are wastefully used as manure. Mussels may be cultivated either on natural beds—especially where clean gravelly bottoms are exposed at low-water, and where salt and fresh water mix—by transplanting spat and protecting young mussels; or in deep water, where transplantation may also be practised. In north Germany and north France mussels are successfully cultivated on wicker-work attached to palisades. The Dutch artificial beds are mainly provided with spat from the coasts of Essex and Kent.

Musselburgh, an old-fashioned town of Midlothian, near the mouth of the Esk in the Firth of Forth, 6 miles E. of Edinburgh by a branch-line (1847). Since 1832 it has united with Leith and Portobello to return one member, the parliamentary burgh including the large fishing-suburb of Fisherrow, with a small tidal harbour, and the pretty village of Inveresk, whose conspicuous spired church was rebuilt in 1805 by 'Jupiter' Carlyle, and occupies a Roman prætorium. Musselburgh's chief features are its celebrated golf-links (since 1817 also the Edinburgh racecourse), Loretto school (marking the site of a famed place of pilgrimage), Pinkie House (1613), the 'Roman' bridge, the quaint tolbooth, and a statue (1853) of David Moir. The manufactures include paper, nets, leather, &c Pop. (1841) 6366; (1891) 8885. See Paterson's *History of Musselburgh* (1857).

Musset, ALFRED DE, one of the most striking figures in the literature of modern France, was born in Paris, 11th December 1810, the son of an official who rose high in the War Office. He was unusually impulsive from his childhood, and precocious alike in sensibility and in genius, and grew up handsome in person and fascinating in manners, though he retained something of the spoilt child all his life. He thought first of law, next of medicine, then of art, but at eighteen discovered himself to be a poet, and scarcely a year after published his *Contes d'Espagne et d'Italie*, a collection of unequal poems, of which *Portia*, *Mardoche*, and *Don Paez* at least are still remembered. A splendid and brilliant youth, of equal grace and assurance, he was warmly received into Victor Hugo's *Cénacle*, the inner shrine of militant Romanticism; was crowned with seductive flatteries by the wider world of society; and in his hunger for premature experience at once flung himself recklessly into the eager pursuit of pleasure in every form. He was eager to feel, and feeling brought suffering in its train, but gave him the impulse out of which came his verse—ever a part of himself, the answering echo of his own emotions. His piece *La Nuit Vénitienne* failed at the Odéon in 1830, and thus turned him from a career in which he was yet to gain triumphs without seeking for them. In 1832 he published *Un Spectacle dans un Fauteuil*, comprising two short plays—*La Coupe et les Lèvres* and *A quoi rêvent les Jeunes Filles*, as well as the poem of *Namouna*, written hastily to eke out a slender volume. Next year followed in the pages of the *Revue des Deux Mondes* two of his very greatest works, the tragical comedies *André del Sarto* and *Les Caprices de Marianne*. It was of Marianne that her creator replied, when asked where he had found her character, 'Nowhere and everywhere; she is not *a* woman, she is woman.' Next followed the famous poem of *Rolla*, which has not sustained the applause with which it was received. Then came the fatal journey to Italy with George Sand. He first met her in the summer of 1833, and the intimacy quickly blossomed into love. The projected tour was at first opposed by De Musset's mother, but George Sand took the extraordinary step of calling upon her one evening, and in a moment of emotion gained her consent. They set out for Venice at the beginning of winter. About the middle of February his letters to his mother and brother ceased; for six weeks there was silence, then on the 10th April he reappeared alone, broken in health and sunk in the deepest depression of spirits. A quarter of a century later, and soon after his death, she gave the world, in the guise of a novel, *Elle et Lui*, her version of the events which led to the catastrophe. Paul de Musset at once retorted with *Lui et Elle* (1859), a book poor as fiction, but which rings like truth. His account was that she had been grossly unfaithful to him, and that his discovery of this in a state of weak health had brought on an almost fatal attack of brain-fever; she, on the other hand, explained the infidelity as but a delusion of the fever itself. It is at anyrate suspicious that but one of the pair suffered deeply, while the other went on calmly writing romances, and utilising the experience at once as impulse and material. The Jacques Laurent of her story bears many a trait of the true De Musset. Despite, or, more probably, in consequence of his sufferings, the five years that followed his return were his best years of production. Another love quickly followed, only to end as unhappily; and that again was succeeded by a series of unworthy and often sordid entanglements, which distracted his heart and were followed by periods of deep depression which alcohol did little to allay. The patronage of the Duc d'Orléans, the warm friendship of a small circle of devoted friends, and his appointment in 1838 to be librarian at the Home Office did something to take him out of himself, but he was ever as capricious in character as in genius, and the feverish activity that sometimes seized him soon exhausted itself in splendid projects and unfinished poems. Even his famous *Confession d'un Enfant du Siècle* (1835), like most of his works, was begun, laid aside, and then finished under a cloud of sorrow. It is not an autobiography, though it owes its sombre colour to its author's personal experience. It is a striking study of moral pathology, full of admirable expression of cynical contempt for the world and of the misery of hopeless doubt; but, as a work of art, it breaks down pitifully at the close into weakness and platitude. When De Musset's health gave way about 1840 his literary activity began to decline also. He was already, in Heine's phrase, 'a young man who has had a splendid past;' he felt himself an old man at thirty, and to the end he was never blessed with anything of the serenity of the Olympians, nor was he even one of those artists who find consolation in their art. The success of *Un Caprice* at the Théâtre Français in 1847 recalled

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him for some time to life and hope, but during his last half-dozen years he wrote nothing of importance. He was elected to the Academy, but not without difficulty, in 1852, and Sainte-Beuve has told us of his coming tipsy to its sittings. 'Musset s'absente trop,' said a member on one occasion; 'Il s'absinthe trop,' was the response. He died of heart disease, May 1, 1857.

Of De Musset's poetry the four pieces entitled *Nuits* mark the highest reach of his lyrical talent. The *Nuit de Mai* and that *d'Octobre* are perfect and immortal poems, like Milton's *Il Penseroso* with passion added, says Sainte-Beuve. The *Nuit de Décembre* is a subtle realisation of that other self that had shadowed all his life. These poems quiver with the quick pulse of life and the throb of suffering, yet the poet's eyes are open throughout to all the innumerable beauties of the universe. The *Ode à la Malibran* is a splendid tribute of admiration to a great actress; the *Lettre à Lamartine*, to a master in his own art; *L'Espoir en Dieu*, a noble expression of the longing of the human soul for certainty; the famous *Rhin Allemand*, a spirited retort to Nikolaus Becker's too patriotic German poem, which brought him a crop of challenges from foolish German officers. The greatest merit of these poems is that they thrill with real, not simulated passion. 'Mon verre n'est pas grand, mais je bois dans mon verre' was his own judgment of himself, and so far as regards his genuineness it is true. He is the poet of a certain range of personal emotions, of youthfulness, and, above all, of passion, in which respect he follows close upon Byron in power, while far surpassing him in unaffectedness and reality, if not always in finish and exquisiteness of art.

His dramatic work is unique in 19th-century literature of its kind for originality, intensity, and variety, linked to brilliant wit and real dramatic genius. It consisted of *comédies*, or regular dramas, full of tragic quality and ending with tragic abruptness, and *proverbes*, the latter short dramatic illustrations of some common saying. Of the former class are *André del Sarto*, perhaps his greatest work; *Lorenzaccio; Les Caprices de Marianne;* and *On ne badine pas avec l'Amour*. To the class of *proverbes* belong *Fantasio* and *Barberine*, both bright and graceful, if fantastic; *Le Chandelier*, slight in structure, but absolutely perfect in art; *Il ne faut jurer de Rien*, more serious, but no less successful; *Un Caprice*, graceful and brilliant; *Il faut qu'une Porte soit ouverte ou fermée*, bright and charming; *Louison*, in verse, less interesting; *On ne saurait penser à tout*, an extravaganza; *Carmosine*, a charming little masterpiece of romance in miniature; and *Bettine*, a lively little drama.

Of his largest although not greatest prose work we have already spoken. It remains only to speak of his brilliant and inimitable *Nouvelles* or short stories and his *Contes*. To the former belong *Les Deux Maîtresses*, in which Valentin is said to have been a study of his own character; *Emmeline; Le Fils du Titien*, perhaps his finest work in prose; *Frédéric et Bernerette*, which grew out of an unworthy *liaison* of his own; *Croisilles;* and *Margot*. The Contes are *Pierre et Camille; Mademoiselle Mimi Pinson*, a charming study of the best aspect of that peculiar Parisian product, the *grisette*, as a work of art an absolute masterpiece; *Le Secret de Javotte; Le Merle Blanc;* and *Lettres de Dupuis et Cotonet*. His *Mélanges* and *Œuvres Posthumes* are less valuable. De Musset's whole work fills but ten small volumes (Lemerre, 1876), but it is not too much to say that these include some of the noblest poetry, greatest plays, and best short stories French literature has yet produced.

See the Life by his brother Paul de Musset (3d ed. 1877), and a good and exhaustive study by Paul Lindau (Berlin, 1876). See also *French Poets and Novelists* (1884), by Henry James, and the excellent study by the late Cyril Francis Oliphant (1890) in the series of 'Foreign Classics for English Readers.' A monograph by Jules Lemaitre is promised in 'Les Grands Écrivains Français,' and a translation of four of the Comedies was published, with an introduction by S. L. Gwynn, in the 'Camelot' series (1890).

Mustang. See HORSE.

Mustapha, a suburb of Algiers (q.v.).

Mustard (*Sinapis*), a genus of plants of the natural order Cruciferæ, now generally included as a sub-genus of Brassica. Three species, all annuals, of Sinapis contribute their seeds to the manufacture of mustard. (1) Black Mustard (*S. nigra*), a native of the middle and the south of Europe, also of Britain, but rare in Scotland; a rather coarse plant, two or more feet high, having the lower leaves lyrate and usually hispid, the upper leaves linear-lanceolate, entire, and hairless. The flowers are yellow, in slender racemes. The pods rarely exceed half an inch in length, closely pressed to the stem. The seeds are deep brown. (2) White Mustard (*S. alba*), a native of southern Europe and western Asia, naturalised in the southern parts of Britain and in Ireland, and in the United States. The whole plant is more or less hairy, the leaves pinnately lobed. The flowers are large compared with those of the preceding species; the pods nearly twice as long, with a long flattened beak, and five prominent nerves; and the seeds are pale yellow. (3) The Wild Mustard (*S. arvensis*), in nearly all parts of the country better known as *Charlock*, is a weed of cultivation only too common throughout Britain and Ireland in cornfields, and in some parts of the United States. It is from the ground seeds of the two first named that mustard is chiefly obtained, but those of the last named are also used in the manufacture of that condiment. The wild mustard is reputed to have yielded the original Durham Mustard, but its seeds are now only gathered for mixing with those of the two preceding species. The black mustard is the most pungent, and is almost exclusively used in the manufacture of mustard on the Continent. White mustard is most favoured in Britain, chiefly because the skin is more easily separated from the seed. The greatest bulk of it is grown in the fens of Lincolnshire and Cambridgeshire, also in Kent and Essex. White mustard is sown in gardens, and used as a small salad. Much of the mustard seed imported from India is Sarepta Mustard (*S. juncea*). Mustard is often adulterated (see ADULTERATION); but 'mustard condiment,' made of mustard flour and wheaten flour or starch flour, is less bitter and stinging than pure mustard, and keeps better. Both black and white mustard seed yield by expression a non-drying fixed oil, which is known as *oil of mustard*, and is free from pungency. When the residual cake, possessing in itself little pungent odour, is treated with water it immediately becomes powerfully irritating to the skin. This is due to a chemical action between an albuminous body, myrosin, and complex bodies differing in the two varieties of seed which are present in the cells. These in presence of water react, giving, in the case of black mustard, a *volatile oil*, having the composition of isosulphocyanate of allyl, C_3H_5SCN, while in the white seed the non-volatile sulphocyanate of acrinyl, C_7H_7SCNO, is produced. This action is similar to that of oil of bitter almonds (see ALMONDS). It is to the formation of these vesicating substances that the pungency and activity of a mustard plaster are due. As the white seed contains more myrosin than the black,

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it is usual to mix the two, so as to fully develop the action of the latter. The use of boiling water is of course inadmissible in forming such a poultice, as it rapidly dissipates the volatile oil, on which the virtues partly depend (see BLISTER). 'Mustard papers,' used as vesicants, are made of mustard flour deprived of its fixed oil. The cake that remains after the oil is extracted may be given to cattle as a condiment. The Mustard-tree of Scripture has been supposed to be *Salvadora persica*, a small tree of the natural order Salvadoraceæ, a small order allied to Myrsinaceæ; but other interpreters insist that the ordinary black mustard is meant in the proverb.

Mustelidæ, a family in the bear section of Carnivores (q.v.), somewhat arbitrarily divided into otter-like (Lutrine), badger-like (Meline), and weasel-like (Musteline) sub-families. See the articles on these and related types.

Musulmân (Persian form of Arabic *Muslim*), a Moslem or Mohammedan. We need hardly add that the termination 'ân' has nothing to do with our word *man*, and that a further English plural Musul*men*, instead of Musulmans, is both barbarous and absurd.

Muta Nzige, a lake of Equatorial Africa discovered by Stanley in 1876, and again seen by him in 1889, and renamed the Albert Edward Nyanza. It occupies the southern end of a vast natural depression, of which the Albert Nyanza (q.v.) fills the northern extremity.

Mute, a small instrument used to modify the sound of the violin or violoncello. It is made of hard wood, ivory, or brass, and is attached to the bridge by means of a slit, its three legs standing between, but clear of, the strings. The use of the mute both softens the tone and imparts to it a peculiar muffled and tremulous quality, which is sometimes very effective. Its application is indicated by the letters *c. s.*, or *con sordino*, and its discontinuance by *s. s.*, or *senza sordino*. A mute, consisting of a pear-shaped leather pad, is sometimes used for the horn and trumpet. It is inserted into the bell of the instrument, thereby subduing the sound and producing the effect of great distance.

Mutiny, as defined by British military law, is 'collective insubordination,' or the combination of two or more persons to resist or induce others to resist lawful military authority. The punishment laid down in the Army Act of 1881 for this crime and for failing when present to use the utmost effort to suppress it, or, when knowing of a mutiny or intended mutiny, failing to give notice of it to the commanding officer, is death or such less punishment as a court-martial shall award. It may be pointed out that, in view of the above legal definition, one man alone cannot be guilty of mutiny, but may be charged with 'insubordination,' a crime which, in its worst forms, is also punishable by death. On board ship the mutiny of the *Bounty* (see PITCAIRN ISLAND) in 1789 is memorable, and of that on board the *Danaë* frigate in 1800; the great naval mutiny at the Nore (q.v.) in 1797 is dealt with specially. The Indian Mutiny is a common name of the Sepoy rebellion of 1857. See INDIA.

Mutiny Act was an act passed by the British parliament from year to year, to regulate the government of the army. The navy and marines, when serving on a ship in commission, are under Naval Discipline Acts, 1861 and 1866, the successors of Articles of War first enacted under Charles II., which, unlike the Mutiny Act, remained in force for an indefinite time. By the Bill of Rights the maintenance of a standing army in time of peace, unless by consent of parliament, was declared illegal, and from that time the number of troops to be maintained, and the cost of the different branches of the service, have been regulated by an annual vote of the House of Commons. Soldiers, in time of war or rebellion, were always subject to military law; but the occurrence of a mutiny in certain Scottish regiments soon after the Revolution raised the question whether the same law could be enforced in time of peace; and it was decided that, in the absence of any statute to the contrary, a soldier in time of peace was only amenable to the common law: if he deserted, he was only liable for breach of contract; or if he struck his officer, to an indictment for assault. The authority of the legislature became indispensable to the maintenance of discipline; and parliament, from 1689 till 1879, conferred this and other powers in the Mutiny Act, limited in its duration at one time to six months, but latterly to a year. Although it was greatly changed from the form in which it first passed, the annual alterations were slight, and substantially it had a fixed form. The preamble quoting the above declaration from the Bill of Rights added that it was judged necessary that a force of specified strength should be continued, while it gave authority to the sovereign to enact Articles of War for the government of that force. The act specified the persons liable to its provisions, treated of courts-martial crimes and punishments, and of military prisons, furlough, Enlistment (q.v.), stoppages, billets, and the conveyance and entertainment of troops. For years prior to 1878 attention had been drawn in parliament and elsewhere to the shortcomings of the act, as well as to those of the Articles of War (q.v.) by which it was accompanied, explained, and amplified. These representations culminated in the appointment of a Parliamentary Committee, which in 1879 presented a Bill to supersede the Mutiny Act, and, like it, to be passed annually as the 'Army Discipline and Regulation Act.' The Marine Forces when serving on shore were under the Marine Mutiny Act up to 1879; then they were brought under the 'Army Discipline and Regulation Act.' In 1881 this act was slightly modified and called the 'Army Act of 1881.' It is brought into force annually by a short act called the Army Annual Act, which lays down the number of troops to be kept up for the ensuing twelve months, the prices to be paid in billets, and any amendments found to be necessary in the Army Act itself. The latter is accompanied by Rules of Procedure for its administration, and contains the whole military law of Great Britain.

Muttra, or MATHURÁ, a town of India, in the North-west Provinces, is situated on the right bank of the Jumna, 30 miles above Agra. For centuries it has been a centre of the Buddhist faith; the surrounding country swarms with associations of Krishna and Balarama (see VISHNU). There are numerous temples and mosques; the river is lined with magnificent flights of stairs, leading down to the bathing-places in the sacred river; large numbers of pilgrims resort to the city on the occasion of its religious festivals; and troops of monkeys and turtles are supported by the charity of the gentle-hearted people. The city has passed through a long series of misfortunes: it was sacked by Mahmud of Ghazni in 1017; its temples were destroyed by a native sultan in 1500, and by Aurungzebe in 1669; and it was plundered by the Afghans in 1756. In 1803 it passed into the hands of the British. Pop. (1881) 57,724.—The *district* has an area of 1453 sq. m., and a pop. (1881) of 671,690.

Muyscas. See COLOMBIA.

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Muzaffarnagar, a municipality in the North-west Provinces of India and capital of a district (area, 1656 sq. m.; pop. in 1881, 758,444), 80 miles NE. of Delhi by rail. Pop. 15,080.

Muzaffarpur, capital of a district (area, 3003 sq. m.; pop. in 1881, 2,582,060) in Bengal, on the Little Gandak, 140 miles N. by rail of the Ganges at Patna. Pop. 42,460.

Myall Wood, the hard violet-scented wood of the Australian *Acacia homalophylla*, much used for making whip-handles and tobacco-pipes.

Mycale, a wooded promontory of ancient Ionia, over against Samos; in the channel between them, Leotychides the Spartan and Xanthippus the Athenian defeated the Persian fleet, 479 B.C.

Mycelium, the vegetative part of fungi which is not concerned in spore-bearing. It may consist simply of a much-elongated cell growing from the spore, or of a chain of cells, but in the majority it is a tissue of interlaced branched filaments or hyphæ, loosely united in many moulds, membranous in dry-rot, compact and tuberous in mushrooms. See FUNGI.

Myce'næ, a very ancient city in the north-eastern part of Argolis, in the Peloponnesus, built upon a craggy height, and said to have been founded by Perseus. It was the capital of Agamemnon's kingdom, and was at that time the principal city in Greece. About 468 B.C. it was destroyed by the inhabitants of Argos, and never rose again to anything like its former prosperity. In Strabo's time its ruins alone remained; these are still to be seen in the neighbourhood of Kharvati, and are noble specimens of Cyclopean architecture. The most celebrated are the 'Gate of Lions,' chief entrance to the ancient Acropolis, and the 'Treasury of Atreus.' Excavations prosecuted at Mycenæ by Dr Henry Schliemann brought to light in 1876 another subterranean treasury and several ancient tombs, containing, with architectural fragments, terra-cottas, vases, weapons, gold death-masks (see MASKS), and other ornaments of thin hammered gold. Good authorities say these objects show a type of art derived from Mesopotamia through Phœnicia and Asia Minor, with little or no trace of Greek tastes, beliefs, or usages. Their date seems to be about that of the Doric invasion (see GREECE, Vol. V. p. 386). See Schliemann's *Mycenæ and Tiryns* (Eng. trans. 1877). In 1889 Tsoundas discovered at Mycenæ a series of tombs of the Achaian period.

Mycetozoa. See MYXOMYCETES.

Myelitis (*myelos*, 'marrow') is the term employed to signify inflammation of the substance of the spinal cord. It may be either acute or chronic, but the latter is by far the most common affection. The *chronic* form begins with a little uneasiness in the spine, somewhat disordered sensations in the extremities, and unusual fatigue after any slight exertion. After a short time paralytic symptoms appear, and slowly increase. The gait becomes uncertain and tottering, and at length the limbs fail to support the body. The paralysis finally attacks the bladder and rectum, and the evacuations are discharged involuntarily; and death takes place as the result of exhaustion, or occasionally of asphyxia if the paralysis involves the chest. In the *acute* form the symptoms are the same as those of the chronic form, but they occur more rapidly and with greater severity, and death sometimes takes place in a few days. Pain may be present in the spine, or in the parts of the body whose nerves proceed from the diseased area of the spinal cord; but it is not usually a prominent symptom when the morbid process begins in the cord itself.

The most common causes of this disease are falls, blows, and strains from over-exertion; but sexual abuses and intemperate habits occasionally induce it. It may also result from other diseases of the spine (as caries), or may be propagated from inflammation of the corresponding tissue of the brain. The treatment, which is much the same as that of inflammation elsewhere, must be confided entirely to the medical practitioner; and it is therefore unnecessary to enter into any details regarding it. When confirmed paralysis has set in there is little to hope for, but in the early stage the disease is often checked by judicious remedies.

Mygale. See BIRD-CATCHING SPIDER.

Mylitta, a Babylonian goddess of fruitfulness, procreation, and birth, in whose honour, according to Herodotus, every girl had once in her life to give herself up to the embraces of a stranger.

Mylodon (Gr., 'grinder-teeth'), a genus of huge fossil sloths, whose remains are found in the Pleistocene deposits of America, associated with the Megatherium and other allied genera. A complete skeleton of the best-known species (*M. robustus*), dug up at Buenos Ayres, measured 11 feet from the forepart of the skull to the end of the tail. Another species from the same region was considerably larger. The genus ranged into North America, the remains of one species (*M. Harlani*) having been found in Kentucky. Although like the modern sloth in general structure and dentition, the immense size of Mylodon forbids us to suppose that it could have had the same arboreal habits, and the modifications of its structure seem to have fitted it for the uprooting and prostrating of the trees, the foliage of which supplied it with food.

Myna (*Acridotheres*, or *Gracula* of Cuvier), a genus of birds of the family Sturnidæ, of which there are seven species ranging over the whole oriental region and Celebes. The head is more or less crested, and some have a naked space behind and under the eye; the bill is rather short, stout, and compressed; the tail is rounded; the feet are strong, the toes long, and the claws moderately curved. The Common Myna (*A. tristis*), which is found throughout India and extends into Assam and Burma, measures about 10 inches in length, and is of a glossy black colour on the head, neck, and breast; the rest of the plumage is snuff-brown, darkest on the back and wing-coverts, and lightest beneath; the wing-quills are black, with a white spot at their base, forming a conspicuous wing-spot; the tail is black, with a white tip; the bill is deep yellow; and the legs are dull yellow. It is one of the commonest birds of India, where it is found in large numbers, being eminently sociable in its habits. It feeds chiefly on insects, grain, and fruit. It makes its nest in nooks and eaves of houses and in holes in the walls of houses and ruins. The eggs, which usually number four or five, are pale bluish green in colour. It has a variety of notes, some musical and pleasing, others harsh. It is often domesticated, when it becomes pert and familiar, and a good imitator of the human voice, in this respect excelling parrots. This bird was introduced into Mauritius to destroy the grasshoppers, which it did very effectively; but in its turn, when naturalised there, it became a pest through its ravages among fruit trees.—The name Hill Mynas or Grakles (q.v.) is given to four distinct races of birds belonging to the genus Eulabes of Cuvier, or Gracula of Linnæus, one from Southern India, another from Ceylon, a third from the Himalayas and Burma, and the last from Malaysia. They are birds of fine glossy plumage with prominent yellow wattles behind the ears. This genus comprises thirteen species found in the oriental region as far as south-west China, Hainan, and Java, and

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in the Australian region in Flores, New Guinea, and the Solomon Islands.

Myopia. See EYE.

Myosin. See GLOBULIN.

Myosotis. See FORGET-ME-NOT.

Myrcia, a genus of trees of the natural order Myrtaceæ, to which belongs the Wild Clove or Wild Cinnamon of the West Indies (*M. acris*), a handsome tree of 20 or 30 feet high. Its timber is very hard, red, and heavy, capable of receiving a fine polish, and much used for cogs of wheels. Its leaves have an aromatic cinnamon-like smell, and an agreeable astringency, and are used in sauces. Its berries are round, and as large as peas, have an aromatic smell and taste, and are used for culinary purposes.—The leaves, berries, and flower-buds of *M. pimentoides* have a hot taste and fragrant smell, and are also used for culinary purposes.

Myrica. See CANDLEBERRY.

Myriopoda (Gr., 'myriad-footed'), a class of terrestrial Arthropods with numerous and very uniform segments. The head is distinct and bears a pair of antennæ, while mandibles and maxillæ form the true mouth-appendages. The legs themselves have six or seven joints, and end in a claw. Respiration is discharged by air-tubes or tracheæ. The class includes two orders, which differ considerably: the Centipedes (Chilopoda), with flattened body, a pair of legs on each ring, the second pair behind the mouth with powerful poison-claws; and the Millipedes (Chilognatha), with cylindrical body, and two pairs of legs on most of the rings. The Centipedes are carnivorous, and their venomous 'bite' is sometimes dangerous; the Millipedes are destructively vegetarian, but otherwise harmless. Generally they avoid the light, and live in the ground, under stones, among moss, under bark, or in similar hidden habitats. A few have a quite ancestral-like simplicity of structure. Fossil forms appear in Carboniferous strata. See CENTIPEDE.

Myristicaceæ. See NUTMEG.

Myrmecophaga. See ANT-EATER.

Myrmidons, the followers of Achilles in the Trojan war. They were an old Thessalian race who colonised the island of Ægina. According to Greek legend, Zeus peopled Thessaly by transforming the ants into men; hence myrmidons (*murmex* = 'an ant').

Myrobalans, the astringent fruit of certain species of Terminalia, trees of the natural order Combretaceæ, natives of the mountains of India. *T. Belerica* produces great part of the myrobalans of commerce of that name; the fruit is about the size of a nutmeg, very astringent, with bitter kernels, to which intoxicating qualities have been ascribed. It is also said to be tonic, but is now scarcely used in medicine. The bark of the tree abounds in a gum, resembling gum-arabic, which is soluble in water and burns away in the flame of a candle. The kernel of the fruit is said to yield an oil which encourages the growth of the hair. Other forms of myrobalans are the Chebulic, the fruit of *T. chebulica;* the Citrine, the fruit of *T. citrina;* and the Indian, which are the small unripe fruits of either or all of the preceding. They are all chiefly in request by tanners, dyers, and the manufacturers of ink. Emblic myrobalans, the fruit of *Emblica officinalis*, of the natural order Euphorbiaceæ, are used in India as tonics and astringents, in tanning, and in the making of ink. For Myrobalan Plum, see PLUM.

Myron, Greek sculptor, a native of Eleutheræ, flourished about 450 B.C. He was a fellow-pupil of Phidias, and excelled in modelling athletes, animals, and figures in motion. His most celebrated works were the 'Discobolos,' 'Ladas the Runner,' 'A Cow,' and 'Athene and the Satyr.' Copies have survived of the first and last only. Myron worked principally in bronze.

Myrrh (Heb. *mur*), a gum-resin produced by *Balsamodendron* (q.v.) *myrrha*, a tree of the natural order Amyridaceæ, growing in Arabia, and also in Somali Land. The myrrh-tree is small and scrubby, spiny, with whitish-gray bark, thinly-scattered small leaves, each consisting of three obovate leaflets with obtuse toothlets, and the fruit a smooth brown ovate drupe, somewhat larger than a pea. Myrrh exudes from the bark in oily yellowish drops, which gradually thicken and finally become hard, the colour at the same time becoming darker. Myrrh has been known and valued from the most ancient times; and was amongst the presents which the wise men from the East brought to the infant Jesus. (The 'myrrh' of Gen. xxxvii. 25, Heb. *lôt*, was probably Ladanum, q.v.) Myrrh appears in commerce either in tears and grains, or in pieces of irregular form and various sizes, yellow, red, or reddish brown. It is brittle, and has a waxy fracture, often exhibiting whitish veins. Its smell is balsamic, its taste aromatic and bitter. It is used in medicine as a tonic and stimulant, in disorders of the digestive organs, excessive secretions from the mucous membranes, &c., also to cleanse ulcers and promote their healing, and as a dentifrice, particularly in a spongy or ulcerated condition of the gums. It was much used by the ancient Egyptians in embalming. The best myrrh is known in commerce as *Turkey Myrrh*, but practically all myrrh comes either from Aden or from Bombay.

Myrrh
(*Balsamodendron myrrha*).

Myrtaceæ, a natural order of exogenous plants, consisting of trees and shrubs, natives chiefly of warm, but partly also of temperate, countries. The order, as defined by the greater number of botanists, includes several sub-orders, which are regarded by some as distinct orders, particularly Chamælauciaceæ (in which are contained about fifty known species, mostly beautiful little bushes, often with fragrant leaves, natives of Australia and Tasmania), Barringtoniaceæ, and Lecythidaceæ. Even as restricted, by the separation of these, the order contains about 1300 known species. The leaves are entire, usually with pellucid dots, and a vein running parallel to and near their margin.—Some of the species are gigantic trees, as the *Eucalypti* or Gum Trees of Australia, and different species of Metrosideros, of which one is found as far south as the Auckland Islands, in 50½° lat. The timber is generally compact.—Astringency seems to be rather a prevalent property in the order, and the leaves or other parts of some species are used in medicine as astringents and tonics. A fragrant or pungent volatile oil is often present in considerable quantity, of which

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Oil of Cajeput and Oil of Cloves are examples. Cloves and Pimento are amongst the best-known products of the order. The berries of several species are occasionally used as spices in the same way as the true Pimento. A considerable number yield pleasant edible fruits, among which are the Pomegranate, the Guava, species of the genus Eugenia, and some species of myrtle.

Myrtle (*Myrtus*), a genus of Myrtaceæ, the characteristics of which are well illustrated in the accompanying figure. The Common Myrtle (*M. communis*) is well known as a beautiful evergreen shrub, or a tree of moderate size, with white flowers. It is a native of all the countries around the Mediterranean Sea, and of the temperate parts of Asia, often forming thickets, which sometimes occur even within the reach of the sea-spray. The leaves are ovate or lanceolate, varying much in breadth. They are astringent and aromatic, contain a volatile oil, and were used in medicine by the ancients as a stimulant. The berries are also aromatic, and are used in medicine in Greece and India. A myrtle wine is also made. Myrtle-bark is used for tanning in many parts of the south of Europe. Among the ancient Greeks the myrtle was sacred to Venus, as the symbol of youth and beauty, was much used in festivals, and was, as it still is, often mentioned in poetry. The myrtle endures the winters of Britain only in the mildest situations in the south. The Small-leaved Myrtle of Peru (*M. microphylla*) has red berries of the size of a pea, of a pleasant flavour and sugary sweetness. Those of the Luma (*M. luma*) are also palatable, and are eaten in Chili, as are those of the Downy Myrtle (*M. tomentosa*) on the Neilgherry (Nilgiri) Hills, and those of the White-berried Myrtle (*M. leucocarpa*) in Greece and Syria. The berries of this species or variety are larger than those of the common myrtle. A very humble species of myrtle (*M. nummularia*) spreads over the ground in the Falkland Islands, as thyme does in Britain. *M. Ugni*, a native of Chili, was about 1865 highly extolled as a fruit-bearing shrub adapted to the warmest districts of Britain; but it proved unfit for open-air culture, though it fruits freely in an unheated greenhouse. The fruit emits an aromatic fragrance which permeates the atmosphere around the plant continually, and the juicy pulp of the berries possesses a rare mixture of sweetness and spiciness which is very agreeable.

Myrtle (*Myrtus communis*): *a*, branch in flower; *b*, vertical section of flower.

Myrtle-wax. See CANDLEBERRY.

Mysia, a district of ancient Asia Minor, having the Propontis (Sea of Marmora) on the N., the Ægean on the W., Lydia on the S., and Bithynia and Phrygia on the E. The Troad (see TROY) was one of its subdivisions.

Mysis, a genus of podophthalmous (stalk-eyed) crustaceans, of the order Stomapoda, much resembling the common shrimps in form.

Mysore, or MAISUR, a native state of Southern India, is surrounded entirely by districts of the Madras Presidency. The area is 24,700 sq. m. Pop. (1881) 4,186,188; (1891) 4,914,110. Mysore is an extensive tableland much broken by hill-ranges and deep ravines, and is divided into two portions, a little north of 13° N. lat., by the watershed between the Kistna and the Kaveri rivers. Numerous isolated rocks (*drugs*), rising to 4000 or 5000 feet, are a peculiarity of the country, and have been mostly converted into hill-fortresses. The rivers are used for irrigation purposes, but are not navigable. The climate of the higher districts is during a great portion of the year healthy and pleasant. The annual value of the exports, chiefly betel nut and leaves, coffee, ragi, gram, cotton, piece-goods, cardamoms, rice, silk, and sugar, is above £1,200,000. The imports, consisting mainly of piece-goods, cloth, wheat, silver, gold, cotton, rice, silk, betel-leaves, and pepper, are over £1,500,000. The ruinous misgovernment of the native prince led the British to assume the administration in 1831; but in 1881 Mysore was restored to the native dynasty. The famine years (1876–78) told with great severity on that state. Chief town, Mysore; but the British headquarters were at Bangalore. For the history of Mysore, see HYDER ALI, TIPPOO SAIB, and INDIA.

The capital of the state, MYSORE, is situated amid picturesque scenery on a declivity formed by two parallel ranges running north and south, 245 miles WSW. of Madras. A prosperous, well-built town, it has broad, regular streets, and substantial houses and public buildings. On the south side stands the fort, which encloses the rajah's palace; its chief object of interest is a magnificent chair or throne of fig-wood, overlaid with ivory and gold. Pop. (1881) 60,292. The gold obtained by the various companies working at Kolar in the east of Mysore amounted in 1877 to 15,403 ounces, in 1888 to 35,073 ounces, in 1889 to about 72,000 ounces.

Mystagogue (Gr. *mustēs*, 'an initiated person,' and *ago*, 'I lead'), the name in the Greek religious system of the priest whose duty it was to direct the preparations of the candidates for initiation in the several mysteries, as well as to conduct the ceremonial of initiation. The same name is applied in the Christian church as early as the 4th and 5th centuries to the catechists or other clergy who prepared candidates for the Christian *mysteries*, or sacraments, of baptism, confirmation, and the eucharist, especially the last.

Mysteries (Gr. from *muō*, 'I close the lips or eyes'), also called *Teletai*, *Orgia*, or, in Latin, *Initia*, designates certain rites and ceremonies in ancient, chiefly Greek and Roman, religions, only known to, and practised by, congregations of certain initiated men and women, at appointed seasons, and in strict seclusion. The origin, as well as the real purport of these mysteries, which take no unimportant place among the religious festivals of the classical period, and which, in their ever-changing nature, designate various phases of religious development in the antique world, is all but unknown. It does seem, indeed, as if the vague speculations of modern times on the subject were an echo of the manifold interpretations of the various acts of the mysteries given by the priests to the inquiring disciple—according to the lights of the former or the latter. Some investigators, themselves not entirely free from certain mystic influences (like Creuzer and others), have held them to have been a kind of misty orb around a kernel of pure light, the bright rays of which were too strong for the eyes of the multitude;

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that, in fact, they hid under an outward garb of mummery a certain portion of the real and eternal truth of religion, the knowledge of which had been derived from some primeval or, perhaps, the Mosaic revelation; if it could not be traced to certain (or uncertain) Egyptian, Indian, or generally eastern sources. To this kind of hazy talk, however (which we only mention because it is still repeated every now and then), the real and thorough investigations begun by Lobeck, and still pursued by many competent scholars in our own day, have, or ought to have, put an end. There cannot be anything more alien to the whole spirit of Greek and Roman antiquity than a hiding of abstract truths and occult wisdom under rites and formulas, songs and dances; and, in fact, the mysteries were anything but exclusive, either with respect to sex, age, or rank, in point of initiation. It was only the speculative tendency of later times, when Polytheism was on the wane, that tried to symbolise and allegorise these obscure ceremonies. The very fact of their having to be put down in later days as public nuisances in Rome herself speaks volumes against the occult wisdom inculcated in secret assemblies of men and women.

How it was that in the best times of Greece these mysteries had such a hold on such large numbers of people is a point about which there need be no mystery. It is perfectly plain. God has at no time left himself without a witness. The Greeks were men; and being men found it impossible to believe that with the death of the body man's life was at an end, or that the sufferings of the innocent met with no reward, the triumph of the wicked with no requital. But the Greeks had no revealed religion, no authoritative teaching on this point. Yet the religious sentiment required some external support for this aspiration, craved some confirmation of this hope. And at the celebration of the mysteries the man or woman whose thoughts were fixed upon the next world found his or her faltering hope strengthened by the sympathy of thousands who were present from the same motives and in the same faith. That this is the secret of the mysteries is indicated partly by the fact that it was the resurrection of various gods which was most prominently set before the eyes of the initiated; and still more by such expressions as that of Pindar (fr. 137), 'Blessed is he who has seen them before he goes below ground;' or of Sophocles (fr. 719), 'Thrice happy they who have been initiated before they die, for theirs is the lot of life, and evil is it with the others;' or of the chorus of the initiated in Aristophanes (*Ran.* 455), 'We alone enjoy the holy light, we, who were initiated and led a life of godliness toward both kin and stranger;' or of the stone record (*Ephem. arch.* 1883), 'To the initiated death is not an evil: it is a gain.'

The mysteries, as such, consisted of purifications, sacrificial offerings, processions, songs, dances, dramatic performances, and the like. The mystic formulas (*Deiknumena*, *Dromena*, *Legomena*, the latter including the Liturgies, &c.) were held deep secrets, and could only be communicated to those who had passed the last stage of preparation at the mystagogue's hand. The hold which the nightly secrecy of these meetings, together with their extraordinary worship, must naturally have taken upon minds more fresh and childlike than our advanced ages can boast of was increased by all the mechanical contrivances of the effects of light and sound which the priests could command. Mysterious voices were heard singing, whispering, and sighing all around, lights gleamed in manifold colours from above and below, figures appeared and disappeared; the mimic, the tonic, the plastic—all the arts, in fact, were taxed to their very utmost to make these performances (the nearest approach to which, in this country, is furnished by transformation-scenes, or sensation-dramas in general) as attractive and profitable (to the priests) as could be. As far as we have any knowledge of the plots of these Mysteries as scenic representations, they generally brought the stories of the special gods or goddesses before the spectator—their births, sufferings, deaths, and specially their resurrections. Many were the outward symbols used, of which such as the Phallus, the Thyrsus, Flower Baskets, Mystic Boxes, in connection with special deities, told more or less their own tale, although the meanings supplied by later ages, from the Neoplatonists to our own day, are various, and often very amazing. The most important Mysteries were, in historical times, those of Eleusis and the Thesmophorian, both representing—each from a different point of view—the rape of Proserpina, and Ceres' search for her: the Thesmophorian mysteries being also in a manner connected with the Dionysian worship. There were further those of Zeus of Crete (derived from a very remote period), of Bacchus himself, of Cybele, and Aphrodite—the two latter with reference to the Mystery of Procreation, but celebrated in diametrically opposed ways, the former culminating in the self-mutilation of the worshipper, the latter in prostitution. Further, there were the Mysteries of Orpheus, who in a certain degree was considered the founder of all mysteries. Nor were the other gods and goddesses forgotten: Hera, Minerva, Diana, Hecate, nay, foreign gods like Mithras (q.v.) and the like, had their due secret solemnities all over the classical soil, and whithersoever Greek (and partly Roman) colonists took their Lares and Penates all over the antique world. The Eleusinian mysteries can be traced back to the 7th century B.C. (cf. *Homeric Hymn to Demeter*, l. 473 ff.) In the time of Herodotus as many as 30,000 people attended them (viii. 65); and between 480–430 B.C., the period of Athens' highest power and of the Eleusinian mysteries' greatest fame, the number must have been much greater. When, towards the end of the classical periods, the mysteries were no longer secret, but public orgies of the most shameless kind, their days were numbered. The most subtle metaphysicians, allegorise and symbolise as they might, failed in reviving them, and in restoring them to whatever primeval dignity there might have once been inherent in them.

See Lobeck, *Aglaophamus* (1829); Preller, in Pauly's *Encyc.* s. v.; Chr. Petersen, *Der geheime Gottesdienst* (1848); Lehrs, *Populäre Aufsätze;* Baumeister, *Denkmäler*, s. v. *Eleusinia;* and P. Stengel, in Müller's *Handbuch der Klassischen Altertums-wissenschaft*, vol. v. pt. 3.

Mysteries and **Miracle-plays** were dramas founded on the historical parts of the Old and New Testaments, and the lives of the saints, performed during the middle ages, first in churches, and afterwards in the streets on fixed or movable stages. Mysteries were properly taken from biblical and miracle-plays from legendary subjects, but this distinction in nomenclature was not always strictly adhered to. We have an extant specimen of the religious play of a date prior to the beginning of the middle ages in the *Christos Paschōn*, assigned, somewhat questionably, to Gregory Nazianzen, and written in 4th-century Greek. Next come six Latin plays on subjects connected with the lives of the saints, by Hroswitha (*c.* 920–968), a nun of Gandersheim, in Saxony, which, though not very artistically constructed, possess considerable dramatic power and interest; they were discovered by Konrad Celtes and by him first published in 1501 at Nuremberg. The performers were at first the clergy and choristers; afterwards any layman

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might participate. The earliest record of the performance of a miracle-play in England is found in Matthew Paris, who relates that Geoffrey, afterwards Abbot of St Albans, while a secular, exhibited at Dunstable in 1110 the miracle-play of *St Catherine*, and borrowed copes from St Albans to dress his characters. Fitzstephen, in his *Life of Thomas à Becket* (1183), describes with approval the representation in London of the sufferings of the saints and miracles of the confessors. On the establishment of the Corpus Christi festival by Pope Urban IV. in 1264, miracle-plays became one of its adjuncts, and every considerable town had a fraternity for their performance. Throughout the 15th and following centuries they continued in full force in England, and are mentioned, sometimes approvingly, sometimes disapprovingly, by contemporary writers. Designed at first as a means of religious instruction for the people, they had long before the Reformation so far departed from their original character as to be mixed up in many instances with buffoonery and irreverence, intentional or unintentional, and to be the means of inducing contempt rather than respect for the church and religion. An example of the degradation of the Mysteries may be seen in the folk-book of Till Eulenspiegel (q.v.). They lingered on after the Reformation, the mystery-play of *The Three Kings of Cologne* being performed at Newcastle so late even as 1599. Remarkable collections exist of English mysteries and miracles of the 15th century, known as the Towneley Mysteries (Surtees Soc. 1836), the Coventry Mysteries (Shakespeare Soc. 1841), the Chester Plays (Shakespeare Soc. 1843), and the York Plays (Clar. Press, 1885).

Out of the mysteries and miracle-plays sprang a third class of religious plays, called *Moralities*, in which allegorical personifications of the Virtues and Vices were introduced as *dramatis personæ*. These personages at first took part in the play along with the scriptural or legendary characters, but afterwards entirely superseded them. The oldest known English compositions of this kind are of the time of Henry VI.; they are more elaborate and less interesting than the miracle-plays. Moralities continued in fashion till Elizabeth's time, and were the immediate precursors of the regular drama.

Miracle-plays and mysteries were as popular in France, Germany, Spain, and Italy as in England; and indeed some of the *pastorales* still acted among the Basques (q.v.) are mere survivals. A piece of the kind yet extant, composed in France in the 11th century, is entitled the *Mystery of the Wise and Foolish Virgins*, written partly in Provençal, partly in Latin. A celebrated fraternity, the Confrérie de la Passion, founded in Paris in 1350, had a monopoly for the performance of mysteries and miracle-plays, the exhibition of each of which took several days. Many of these are still extant.

It is a mistake to suppose that the hostility of the Reformers was what suppressed these exhibitions. The fathers of the Reformation showed no unfriendly feeling towards them. Luther is reported to have said that they often did more good and produced more impression than sermons; and Bishop Bale's *Brefe Comedy of Johan Baptyste* (1538) is an onslaught on the friars. The most direct encouragement was given to such plays by the founders of the Swedish Protestant Church, and by the earlier Lutheran bishops, Swedish and Danish. The authorship of one drama of the kind is assigned to Grotius. In England the greatest check they received was from the rise of the secular drama; yet they continued to be occasionally performed in the times of James I. and Charles I., and it is well known that the first sketch of Milton's *Paradise Lost* was a sacred drama, where the opening speech was Satan's Address to the Sun. A degenerate relic of the miracle-play may yet be traced in some remote districts of England, where the story of St George, the dragon, and Beelzebub is rudely represented by the peasantry. Strange to say, it was in the Catholic south of Germany, where these miracle-plays and mysteries had preserved most of their old religious character, that the severest blow was levelled against them. In 1779 a manifesto was issued by the Prince-archbishop of Salzburg, condemning them, and prohibiting their performance, on the ground of their ludicrous mixture of the sacred and the profane, the frequent bad acting in the serious parts, the distraction of the lower orders from more edifying modes of instruction, and the scandal arising from the exposure of sacred subjects to the ridicule of freethinkers. This ecclesiastical denunciation was followed by vigorous measures on the part of the civil authorities in Austria and Bavaria. One exception was made to the general suppression. In 1633 the villagers of Oberammergau (q.v.), in the Bavarian highlands, on the cessation of a plague which desolated the surrounding country, had vowed to perform every tenth year the Passion of Our Saviour, out of gratitude, and as a means of religious instruction; a vow which had ever since been regularly observed. The pleading of a deputation of Ammergau peasants with Maximilian of Bavaria saved their mystery from the general condemnation, on condition of everything that could offend good taste being expunged. It was then and afterwards somewhat remodelled, and is perhaps the only mystery or miracle-play which has survived to the present day—taking place every ten years (1870, 1880, 1890, &c.). The inhabitants of this secluded village, long noted for their skill in carving in wood and ivory, have a rare union of artistic cultivation with perfect simplicity. Their familiarity with sacred subjects is even beyond what is usual in the alpine part of Germany, and the spectacle seems still to be looked on with feelings much like those with which it was originally conceived. What would elsewhere appear impious, is to the alpine peasants devout and edifying. The personator of Christ considers his part an act of religious worship; he and the other principal performers are said to be selected for their holy life, and consecrated to their work with prayer. The players, about 500 in number, are exclusively the villagers, who, though they have no artistic instruction except from the parish priest, act their parts with no little dramatic power, and a delicate appreciation of character. The New Testament narrative is strictly adhered to, the only legendary addition to it being the St Veronica handkerchief. The acts alternate with *tableaux* from the Old Testament and choral odes. Many thousands of the peasantry are attracted by the spectacle from all parts of the Tyrol and Bavaria, among whom the same devout demeanour prevails as among the performers. Plays of a humbler description, from subjects in legendary or sacred history, are not unfrequently got up by the villagers around Innsbruck, which show a certain rude dramatic talent.

See Leroy's *Études sur les Mystères* (1837); Monmerqué and Michel, *Théâtre François au moyen âge, 12e-14e Siècles* (1839); Mone, *Schauspiele des Mittelalters* (1846); A. d'Ancona, *Sacre rappresentazione dei Secoli 14-16* (Flor. 3 vols. 1872); Sepet, *Le Drame Chrétien au moyen âge* (1878); Petit de Julleville, *Histoire du Théâtre en France* (2 vols. 1880); *Miracle-plays*, by K. Hase, trans. by Jackson (1880); A. W. Pollard, *English Miracle-plays, Moralities, and Interludes* (1890); the classified list of *References for Students of Miracle-plays and Mysteries*, by Francis H. Stoddard (Berkeley, U.S. 1887); and, for the passion-play at Oberammergau, works by Seguin, Tweedie, Farrar, and others.

Mysticism is not so much a definite system of thought as a tendency of religious feeling, cher-

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ished more or less at different periods in most religions by individuals or groups: the essential element being the effort to attain to direct and immediate communion with God or the divine. The tendency appears in the Mysteries (q.v.) of the Greeks, but is more marked in Buddhism, in various Hindu sects, in Sufism, and is the most prominent feature in Neoplatonism and some of the Gnostic systems. But it is more especially to Christian writers of the middle ages that the name of mystics is wont to be given, one of the earliest being Dionysius the Areopagite, followed by Scotus Erigena; and this mode of thought or mood of mind developed itself specially in opposition to the dry, cold, rationalistic formalism of scholastic theology. Among the great Catholic mystics are Bernard of Clairvaux; his contemporaries the Victorines—Hugo, Richard, and Walter of St Victor near Paris; Bonaventura; John of Chur (died 1380); and Thomas à Kempis. The German mystics are specially Meister Eckhart, Suso, Tauler, Ruysbroeck. Aberrant or fanatical forms are found amongst the Fraticelli, Beghards, Beguines, the Brethren of the Free Spirit, the Brethren of the Common Life (to whom Thomas à Kempis belonged), and the Anabaptists. Less theological and more philosophical are Paracelsus, Bruno, Campanella, Jacob Boehme, Schelling, and Swedenborg. In England William Law is a conspicuous example; and some of the Cambridge Platonists like Henry More were to some extent mystical in their religious teaching. Millenarianism has produced several types; from Jansenism sprang the Convulsionaries. In modern Catholicism St Theresa, Fénelon, Madame Guyon, Molinos, the Quietists, and Bourignon may be specially mentioned. Most of them are discussed in separate articles.

See BOEHME, ECKHART, &c., in this work; also ILLUMINATI, ROSICRUCIANS, THEOSOPHY; Vaughan, *Hours with the Mystics* (1856; 3d ed. 1880); Du Prel, *The Philosophy of Mysticism* (trans. by Massey, 1889); and German works on the subject by Görres (1846), Helfferich (1842), Noack (1853), Preger (1881).

Mythology. A myth is a story told about gods or heroes. Mythology is a term sometimes applied to the collected myths of a nation, sometimes to the scientific study of myths. Mythology in the latter sense of the term has for its object not to ascertain why men believe in gods—that is rather the business of the science of religion—but, granted the belief, why men tell these (sometimes extraordinary) stories about them. The first nation to busy itself with this enquiry was the nation whose mythology had the most luxuriant development, the Greeks. From very early times they started their enquiry with the assumption that there must be something behind the myths as known to them—that there was some meaning in a myth. Thus far, they were as regards most myths quite right. The mistake, however, which the Greek philosophers who undertook to recover the original meaning of various myths made was that they imagined the authors of these myths to be, like themselves, philosophers. In other words, they imagined that not only was there a meaning concealed behind myths, but that that meaning had been intentionally concealed, and that myths were the vehicles by which philosophical teaching had been originally conveyed, and in which it might still be detected. Myth was identified with allegory. The particular branch of philosophy supposed to be veiled by mythology depended on the taste of the particular mythologist. Anaxagoras discovered psychological teaching behind the veil; Empedocles found his own theory of the four elements capable of being stated in terms of mythology (see EMPEDOCLES), and he thus effected the first reconciliation between science and religion. And speaking generally, we may say that from that day to this the magic mirror of mythology has never failed to show to every enquirer that which he wished to see in it. The next attempt at interpretation, which also proceeded from Greece, was to strip myth of all that was supernatural and affirm the residuum to be history (see EUHEMERISM, to which article it is only necessary here to add that in the opinion of Gruppe, in *Die griechischen Culte und Mythen* (vol. i. 1887), the work of Euhemerus was not intended as an explanation of mythology, though it was subsequently regarded as such, but was a romance of much the same character as some of Lucian's work or *Gulliver's Travels*). It is interesting to note that in India an independent attempt was made by the Aitihasika school to explain the mythology of the Vedas as history clothed in the garb of the supernatural. The two modes of interpretation already described—the allegorical and the Euhemeristic—continued to be the only methods applied throughout Roman and Christian times to the present century, nor can they be said to be wholly extinct even now. At Rome the Stoics, developing systematically what had been rather suggested than definitely formulated by Empedocles, endeavoured to explain all myths as but allegorical descriptions of physical facts. They failed, however, to explain just those myths which most required explanation, the immoral, brutal, and bestial myths, for examples of which we may refer to Vol. V. p. 385 of this work. Their failure was the more remarkable inasmuch as in India the same key had been applied by the native grammarians with considerable apparent success: but we must remember that the science of grammar had been already carried to great perfection in India, and that some of the mythological figures in the Vedas have names which are much more obviously names of nature-powers than is the case in Greek mythology. For instances of native Indian interpretations we may refer to Max-Müller's *History of Ancient Sanskrit Literature*, p. 529. Inadequate as was the allegorical interpretation of myth, it continued to enjoy an undisputed mastery of the field of investigation in Europe for many centuries. But, as it was sterile to the end, we need here only mention the fact that the latest and most learned form in which it appeared was the *Symbolik und Mythologie der alten Völker* of Creuzer (q.v.), published 1810–12. The effect of the publication of this work was to overthrow the mode of interpretation which it was designed to prove and illustrate. It led to a thorough investigation of the assumptions on which the allegory theory was based; and an era in the history of mythology as a science is marked by the demonstration given by Lobeck in his *Aglaophamus* (1829), of the utter untenability of these assumptions. What is implied in any theory which explains myths as truths conveyed in the form of allegories is the existence of a caste or class of priests or philosophers, possessing a recondite knowledge and teaching it by means of parables. Now the existence of such a class or caste is a matter which requires to be proved, and of which the proof must satisfy the canons of historical criticism. And it may safely be said that there is absolutely no evidence whatever to show that such a class ever existed amongst the Greeks or any other Indo-Germanic nation.

The establishment of this negative conclusion by Lobeck paved the way for the next step forward in the science of mythology. Scholars had hitherto assumed that the authors of myths were men of learning, philosophers. After the exposure of this error, the next step was to recognise the necessity not only of throwing aside our modern, civilised, artificial ideas, but also of

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endeavouring to see the myths in 'the light in which they presented themselves to the Homeric or Hesiodic audience.' The conviction of this necessity manifests itself, after the time of Lobeck, in Grote, from whom the quotation in the last sentence is made, Lehrs (*Gott, Götter, und Dämonen*), and Renan (*Études de l'Histoire Religieuse*). Now, if we try to see myths as primitive man saw them, we can hardly doubt that to the Greek of Homer's time or Hesiod's Aphrodite must have presented herself as the ideal of female beauty, Demeter as the perfect type of motherhood, and so on. Thus far it was thought, by Grote and others, possible to go in the way of interpretation: the Greek was at all times characteristically given to anthropomorphism. But to go further and try to explain not only the individual figures of the gods, but the relations in which those figures are represented by myth as standing to each other, was, by a natural reaction against the exploded system of allegorical interpretation, considered to be futile. Primitive man is but a child; he lives in a world of dreams and fancies which are to him as real as the waking world of facts. As for coherence or meaning in what he chose to dream about his gods, you may as well undertake to decide what shapes the clouds have or what words the bells say. The imagination knows no law, or at the most is subject only to the laws of poetical and æsthetic consistency. It is vain to endeavour to go beyond the myth, or behind it. It is like the curtain of Zeuxis, which was itself the picture. There is nothing behind it. This, as we have said, was a natural reaction, but the pendulum swung too far. No one at the present day would think of denying that in many cases there is something behind the veil—that most myths have a meaning of some kind. Nor would any one now admit that myths possess poetic or æsthetic consistency; on the contrary, one of the problems of scientific mythology is to explain the inconsistency of feeling which is to be found in myths relating to the same subject, to explain, for instance, the repulsive origin attributed by mythology to Aphrodite, the type of feminine beauty, or the amour carried on by Demeter, the ideal of motherhood, in the shape of a mare, with Poseidon.

A partial solution of this problem was afforded by the brothers Grimm (q.v.), whose labours mark a new era in mythology. While collecting their famous fairy tales from the mouths of the people, they were forced to the conclusion that many a tale which had hitherto only been known in a literary form had existed orally long before it had been put on paper or shaped into verse, and the further inference from this became the wide-reaching conclusion that mythology was not, as the allegory theory had falsely taught, the work of the superior few, but the production of the people. It was the way in which the many expressed their religious feeling. It was their only mode of expression, and it was theirs exclusively. The current of mythology, on this theory, flows from the lower strata of society to the upper. Here we have an explanation of the incongruity existing in the myths told of Aphrodite or Demeter, for instance; for myths could not be perpetually retold in one generation after another without being reshaped to suit the changing modes of thought of different generations. But it will be also noticed that, granting that the current of mythology is upwards from below, we are no nearer an answer to the question, Why do men tell the extraordinary stories they do tell about their gods? The quarter, however, in which an answer to this question might be looked for was indicated by Grimm.

One and the same myth may be found, in different forms, amongst different Aryan peoples (see Vol. I. p. 471), and although some such myths may have been borrowed by one people from another, just as one language may borrow words from another, still the resemblances between the myths of different Aryan peoples could, like the resemblance between their languages, be only properly accounted for on the supposition that they had been handed down by each separate people from a time when the forefathers of all were united in one home, one tongue, one faith. In fine, the solution of the problem was to be sought in the application of the comparative method to the study of mythology, and in the creation of a comparative mythology of the Aryan peoples. The verification of this hypothesis was supposed to have been effected when it was discovered that the literature of Sanskrit threw the same light on the structure of myths as the language of Sanskrit had thrown on the structure of the Aryan tongues. Comparative mythology may fairly be said to be the creation of two scholars—in Germany Adalbert Kuhn (1812–81), and in England Max-Müller (q.v.). The object of the school founded by them is to trace myths back to Aryan times, to determine their original forms, and, having done this, to show what was their original meaning, and any changes that may have subsequently come over that meaning. Their guiding principle is that in the Vedas (q.v.) we see Aryan myths in their earliest form—indeed, that we see them in process of making. The conclusion to which they come is that, owing to the defects of language in its earliest stage, the primitive Aryan could only speak of natural objects as living things, and that in consequence he came to believe that all nature was possessed of life. Again, as in language we can only predicate of a subject something which the subject is not, so in myth, primitive man could only express a phenomenon of nature by comparing it with something which it was not—in fact, could only express it by a simile. When in course of time, and owing to the 'disease of language,' the meaning of the simile came to be forgotten, what had originally been a very innocent comparison might become a very repulsive myth. For instance, the sun's relation to the dawn may be likened to that of a husband to his wife, or of a son to his mother; and a myth of incest may be the result.

The reaction against the allegory theory, which was strongest in the time of Grote, has, we observe, ceased by the time of Max-Müller, and the pendulum once more approaches more nearly to the true mean. According to the comparative mythologists, there is, after all, something behind myth; not, however, an intentionally veiled meaning, but an unintentionally forgotten substratum, a simile originally descriptive of some natural phenomenon. But though this school is right in maintaining that myths have a meaning, and that in some cases the meaning is to be found in a metaphorical description of the sun, the dawn, the wind, &c., the extremes to which this mode of interpretation has been pushed have caused a revolt amongst recent mythologists. The earliest insurgent, Mannhardt (1831–89), was content to turn from the Vedas to popular beliefs and folk-tales as the earliest stratum accessible to the comparative mythologist; but the latest revolter, and we may say the greatest, that is Gruppe, rejects the comparative method altogether, and undertakes to demonstrate in his second and following volumes that myths have been borrowed by one nation from another, not handed down from the common ancestors of the separate peoples. It seems indeed impossible to deny that, with regard to the importance of Sanskrit, the same mistake has been made by comparative mythologists as was at first made by comparative philologists. The conviction is spreading that the myths of the Vedas

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form a literary mythology which is nothing like so near to the myth-making stage in the history of a people as are many of the popular traditions of the peasantry of Europe. On the other hand, although Max-Müller and his school have been guilty of many offences against the canons of comparative philology in their desire to identify the names of mythological figures, Gruppe undoubtedly has gone too far in asserting that comparative philology lends no support whatever to the belief that the Aryans possessed any gods at all. Zeus, Aurora, and Agni may safely be said to have been known to the Aryans, and to have been worshipped as deities.

Another series of attacks has been made upon the Kuhn and Müller school on the ground that, if the comparative method is to be applied, it should be applied to the whole of the facts, and not to one particular section of them. In other words, we must not confine ourselves to Aryan myths, but must open our eyes to the fact that nearly every Aryan myth can be paralleled by similar tales from the remotest quarters of the globe. No explanation which explains only a part of the phenomena and leaves other exactly similar phenomena unexplained can possibly be the right explanation. Obviously, therefore, it is impossible to find the key to all the mythologies in any peculiarity of language, for such peculiarity or 'disease' would only affect the mythology of the nations speaking that language or family of languages. The mythologist has not only to answer the question why men tell their extraordinary tales about the gods, but also the question why do they all tell the same sort of story, no matter what race or clime they belong to. The theory that all myths are derived from a common centre, from which they spread in all directions over the face of the earth by borrowing, would explain the similarity in the myths; but, until that theory is more fully elaborated than it is at present, the field is held by a theory of mythology of which the most distinguished champion in England is Mr Andrew Lang (q.v.). It is, briefly, that myths are survivals from a primitive stage of culture through which all races pass, and in which they much resemble each other. *Ex eisdem eadem.* Primitive man, whether of the stone age on this side of the world or on the other, chipped his flint implements in much the same way; and no one thinks of accounting for the resemblance between the implements thus manufactured by any theory of borrowing or of common descent. It is obvious that the same causes acting on the same organisms produce similar results, and this is as true of mental and moral culture as of material culture. Here, too, we have the explanation of the strange nature of many myths; what seems brutal to us does not seem brutal to the savage. There is therefore nothing surprising in the fact that the gods and heroes of the savage are, like himself, savages. Above all, the same problems presented themselves to primitive peoples in all parts of the world, and were solved by the aid of the same analogies. What was the origin of man? of the world? What causes rain? Why does the wind blow? Why does the sun behave as he does? Why are certain customs observed? The answers which commended themselves to primitive man constitute mythology. At the same time there is no reason to believe that primitive man was not as fond of hearing and telling stories as civilised man is of reading novels. And though most myths may be the explanations which were invented to explain what seemed to primitive man to need explanation, some myths probably were from the beginning designed solely for the gratification of the imagination.

In addition to the works of Creuzer, Lobeck, Grote, Lehrs, Renan, Grimm, and Gruppe already referred to, see Max-Müller's various works, and particularly his *Biographies of Words;* Mannhardt, *Wald und Feldkulte;* Schrader, *Prehistoric Antiquities of the Aryan Peoples;* E. B. Tylor, *Early History of Mankind* and *Primitive Culture;* A. Lang, *Custom and Myth* and *La Mythologie* (Paris, 1886); Canon Taylor, *Origin of the Aryans;* Chantepie de la Saussaye, *Religions-geschichte;* C. Petersen, article *Mythologie* in Ersch and Gruber; L. Preller, *Griechische Mythologie;* P. Decharme, *Mythologie de la Grèce antique;* and Roscher's *Lexikon der Mythologie.* See also the articles in this work on such mythologists as Euhemerus, Cox, Gubernatis, Lang, Max-Müller; those on the several gods; and the following:

Ancestor-worship.	Demonology.	Magic.
Animal-worship.	Divination.	Mysteries.
Animism.	Egypt (religion).	Rome (religion).
Auguries.	Greece (religion).	Scandinavian Mythology.
Beast-fables.	Hesiod.	Totemism.
Bidpai.	Homer.	Witchcraft.
Cosmogony.	India (p. 104).	

Myxœde'ma is the name generally accepted for a diseased condition first described by Sir William Gull in 1873. It occurs in adults, generally females, and is characterised by a thickening of the subcutaneous tissue, most noticeable in the face (which becomes enlarged, swollen-looking, and expressionless) and the hands, with a simultaneous dulling of all the faculties and slowing of the movements of the body. A precisely similar condition occurs in many cases where the thyroid gland has been removed for disease. Myxœdema is very slow in its progress, but undoubtedly tends to shorten life. It greatly resembles cretinism, except that the mental condition is much less affected, and that the deformities resulting from arrested development are not present. See Horsley in *Brit. Med. Journal*, January 1885.

Myxomycetes, or MYCETOZOA, a class of very simple organisms, often claimed by botanists as fungi, generally regarded by zoologists as primitive Protozoa, the fact being that they have not taken any very definite step along either of the lines which lead to plants or to animals. One of the most familiar is *Fuligo* or *Æthalium septicum* —the 'flowers of tan'—which spreads in summer on the bark of the tan-yard. They live on damp surfaces exposed to air, especially on rotting wood, and feed on organic debris. They form composite masses or *plasmodia*, in which numerous units are fused, or in rare cases simply combined in close contact. On the margins of such a mass amœboid processes of living matter flow in and out, with streaming internal movement, and the plasmodium spreads towards moisture, food, and warmth, or away from the light. Drought, cold, or scarcity of food produce a dormant encysted stage. At other times part of the plasmodium divides into spores, each enclosed in a coat, which bursts and liberates a swarm spore, sometimes flagellate, always eventually like a little amœba. A number of these minute amœbæ unite to form the plasmodium from which we started. About two hundred species have been described. See FUNGI, PROTOZOA; De Bary, *Die Mycetozoen* (1864); Zoph, *Die Schleimpilze*, in Schenk's *Botanik*, iii. (1887).

Mzensk, a town in the Russian government of Orel, 200 miles SSW. of Moscow. Pop. 15,067.

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N

N the fourteenth letter in our alphabet, is derived from the hieroglyphic sign for water (see ALPHABET). When taken over by the Phœnicians it was called *nun*, 'the fish.' The earliest Greek form was Ν, which afterwards became N. Our script form, *n*, is derived from the old Roman cursive. The sound of *n* is defined as a nasal dental. It is produced when the organs are in the position for pronouncing *d*, and the breath is allowed to pass into the nose. Hence *n* attracts *d*, as in *expound* from *expono*, *sound* from *sonus*, or in *thunder* and *hind* from Old English *thunor* and *hine*. Our two nasals *m* and *n* also interchange according to the nature of the following consonant. If it is a labial *n* changes to *m*, as in *hemp* from Old English *hanep*, or *comfort* from *confortare*; but if it is a dental *m* changes to *n*, as in *ant* from Old English *æmete*, or *count* from *computare*. We also find an intrusive *n* before gutturals and dentals, as in *nightingale* from Old English *nihtegale*, *messenger* from *messager*, *passenger* from *passager*, or *lantern* from *laterna*.

Naas, a garrison town of Kildare county, Ireland, 20 miles SW. of Dublin by rail; pop. 3808. Once the capital of Leinster, Naas obtained charters from Henry V., Elizabeth, and James I., but was disfranchised at the Union.

Nabatæans, a people of northern Arabia, generally considered to have been of pure Arab blood, though some authorities, identifying them with the Ishmaelite tribe of Nebaioth, regard them as having been closely akin to the Edomites. They took possession of the country once occupied by the Edomites; and in the beginning of the 3d century B.C. they were one of the most powerful amongst the Arab tribes, warlike, with a force of 10,000 fighting men, nomadic, and busy carriers of merchandise between the East and the West. In 312 B.C. Antigonus, the general of Alexander, made an attack, unsuccessful, upon their desert fastness of Sela or Petra (q.v.). By the 1st century B.C. they had shaped their power into a kingdom; in the time of St Paul their king Aretas, who died in 40 A.D. after a reign of forty-eight years, was master of Damascus and Cœle-Syria. They were in antagonism successively to the Syrian monarchs, the Maccabæan rulers of Judea, and the Romans, but eventually acknowledged the supremacy of these last. Nevertheless Trajan, in 105, captured their stronghold and put an end to their kingdom. They possessed a certain measure of culture, derived from the Syrians. The language of their coins and inscriptions is Aramaic. See Charles Doughty, *Documents Épigraphiques recueillis dans le Nord de l'Arabie* (1884), and books cited at EDOM.

Nabha, a Sikh principality under the political control of the Punjab, cis-Sutlej, to the E. of Patiala and S. of Loodiana; area, 928 sq. m. Pop. 261,824.

Nablus, corrupted from the Greek *Neapolis*, the ancient *Shechem*, a town of Palestine, stands on the highest part of the pass, between Mounts Ebal and Gerizim, that leads from the Mediterranean to the Jordan. In the same valley or gap are Jacob's Well, the Tree of the Sanctuary, and Joseph's grave. At first a Canaanite city, it was destroyed by Abimelech, a son of Gideon the Judge. Here Rehoboam was crowned king of Israel. The place became the religious centre of the Samaritans (q.v.). The Greek city gave birth to Justin Martyr, and suffered much during the Crusades. See *Memoirs of Palestine Exploration Fund*, vol. iii.

Nabob, an Anglo-Indian corruption of the word *Nawâb* ('deputy'), was the title belonging to the administrators of provinces under the Mogul empire. The title was continued under the British rule, but it gradually came to be applied generally to natives who were men of wealth and consideration. In Europe it is applied more or less sarcastically to those who, having made great fortunes in the Indies or in foreign parts generally, return to their native country, and live there in oriental splendour.

Nabonassar. See BABYLONIA.

Nachtigal, GUSTAV, German traveller, was born 23d February 1834, at Eichstedt, between Magdeburg and Wittenberg, studied medicine, and served as army surgeon until 1863. In that year he went to North Africa, suffering from a chest disease. In 1868, through the influence of Rohlfs, he was selected to carry presents from the king of Prussia to the sultan of Bornu. Starting from Tripoli in 1869, he travelled by way of Fezzan and Tibesti to Bornu, made excursions into the states of Borgu and Bagirmi, and returned home by way of Wadai, Dar-Fûr, Kordofan, and Cairo, where he arrived on 22d November 1874. This long and successful journey, in the course of which he visited, the first of Europeans, the native states of Tibesti, Borgu, and Wadai, put him in the forefront of modern travellers. His vast collection of most valuable information was written down in the three vols. of *Sahara und Sudan* (1879–89). In 1884 Nachtigal was commissioned to annex for Germany Togoland, Cameroons, and Lüderitzland (Angra Pequeña) on the west coast of Africa. He died on the return journey off Cape Palmas, 19th April 1885, and was buried on that rocky promontory; but in 1887 his bones were removed to German soil in the Cameroons. See Dorothea Berlin's *Erinnerungen an Nachtigal* (1887).

Nacre. See PEARL (MOTHER OF).

Nadir (Arabic *nazir*), that point in the heavens which is diametrically opposite to the Zenith (q.v.), so that the zenith, nadir, and centre of the earth are in one straight line. The zenith and nadir form the poles of the Horizon (q.v.).

Nadir Shah of Persia, the Conqueror, belonged to a Turkish tribe, and was born in Khorassan in 1688. He entered the service of the governor of Khorassan, and soon obtained high promotion; but, having been degraded for some offence, he betook himself to a lawless life, and for several years was the daring leader of a band

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of 3000 robbers, and gradually extended his territorial authority. Persia was at this time ruled by Ashraf, an Afghan, whose grinding tyranny and cruelty produced in the mind of every Persian a deadly hatred of the very name Afghan. Nadir having avowed his intention of expelling the hated race from the country and restoring the old dynasty, numbers flocked to his standard, and Meshed, Herat, and all Khorassan were speedily reduced. Ashraf, signally defeated in several engagements, fled before the avenger, who, with a celerity only equalled by its thoroughness, purged Persia of even the semblance of Afghan domination. The rightful heir, Tamasp, then ascended the throne, and Nadir received for his services the government of the provinces of Khorassan, Mazanderan, Seistan, and Kerman. He was sent against the Turks in 1731, and defeated them at Hamadan; but his sovereign having engaged unsuccessfully the same enemy, Nadir caused him to be put in prison, and elevated his infant son, Abbas III., to the throne in 1732. The death of this puppet, in 1736, opened the way for the elevation of Nadir himself, who was crowned as *Nadir Shah*. He resumed the war with the Turks, and, though totally defeated in the first two battles, turned the tide of fortune in the subsequent campaign. He also conquered Afghanistan, and drove back the invading Uzbegs. Difficulties arose with the Great Mogul, and, his envoy having been murdered at Jelalabad, Nadir ravaged the North-west Provinces, and took Delhi, which he pillaged. With booty to the amount, it was said, of £20,000,000, including the Koh-i-nûr (see DIAMOND), he returned to the west bank of the Indus. He next reduced Bokhara and Khaurezm, restoring to Persia her limits under the golden reign of the Sassanides. From this period his character underwent a sudden change; he became suspicious, avaricious, and tyrannical, and was assassinated 20th June 1747. See H. Maynard's *Nadir Shah* (Stanhope Essay, 1885).

Nadiya, capital of a district in Bengal, on the Bhagirathi River, 63 miles N. of Calcutta; pop. 14,105. It was the residence of the last independent Hindu king of Bengal (till 1203).

Nævius, GNÆUS, with the exception of Livius Andronicus, the earliest of the creators of Latin literature, was born, probably in Campania, about 265 B.C. In his youth he served in the first Punic war, made his first appearance at Rome as a dramatic writer in 235, and continued his activity for thirty years. Of his life we know little, save that he was very decidedly attached to the plebeian party, and in his plays satirised and lampooned the Roman nobles with all the virulence and indiscretion of a hot-blooded impetuous Campanian—that Gaseon of ancient Italy. He incurred the especial hostility of the Metelli, and was imprisoned at their instance, as we learn from a passage in the *Miles Gloriosus* of Plautus. He was ultimately obliged to retire to Utica in Africa, where he died after 204. Besides his dramatic writings, comprising both tragedies and comedies, he wrote an epic poem, *De Bello Punico*, in the old Saturnian metre. His work bore the stamp of the national genius, and its vigour and invention gave pleasure to Cicero and to Horace. Only a few very unimportant fragments are extant, which may be found in editions more or less complete by Vahlen (1854) and Ribbeck, *Scenicæ Poesis Romanorum Fragmenta* (2d ed. 1871–73). See also Sellar's *Poets of the Roman Republic*, and Ribbeck, *Die Römische Tragodie* (1875).

Nævus (Lat., 'a mole;' known popularly as *mother-spot* or *birth-mark*) is a congenital mark or growth strictly on a part of the skin. The most frequent form is the *pigmentary nævus*, or *mole*. This may be simply a darker pigmentation of a circumscribed portion of skin; or the pigmented skin may be thickened and rough as well, and is often thickly covered with hair. Moles do not tend to increase, and do not need to be treated unless for the sake of appearance. In that case, removal by knife or destruction by caustics must be resorted to.

When the name is used without qualification, a *vascular nævus* or overgrowth of capillary blood-vessels is generally meant, and the term is used of such abnormal growths in whatever organ or tissue they occur. The slightest form is sometimes called *port-wine stain*, and is sufficiently described by the name: there is just so much overgrowth as to produce a deep red discoloration, without appreciable swelling of the part affected. Frequently the abnormal tissue forms a distinct tumour, either in the skin, when it is of a dark red colour, or beneath it, when it may sometimes be recognised by a blue or purplish tinge. The most frequent situations of these vascular nævi are the skin and subcutaneous cellular tissue of the face and head; but they may occur elsewhere. The popular belief is that they are caused by the longing of the mother during her pregnancy for a lobster, or strawberry or raspberry, or some other red-coloured article of food, and that the influence of her mind has impressed upon the fœtus a more or less vivid image of the thing she longed for; and hence the name of *mother-spot*. Sometimes these tumours waste away spontaneously, and give no trouble; but frequently they increase rapidly, invade the adjacent tissues, and ulcerate or slough, and thus become dangerous to life by hæmorrhage. When these tumours do not show a tendency to increase no treatment is necessary, except to remove the disfigurement. When treatment is desirable many different methods may be employed, according to the form and situation of the tumour: e.g. removal by knife or ligature; coagulation of the contained blood by electrolysis; production of inflammation by application of caustics or, in infants, by vaccination upon the nævus.

Nâga is, in Hindu Mythology, the name of deified serpents. Their king is Sesha, the sacred serpent of Vishnu.

Naga Hills, a district of British India, the south-eastern extremity of Assam, with an approximate area of 6400 sq. m. and a pop. of 110,300. It consists of a mountainous region, covered with jungle and forest, the haunt of various wild animals, and is inhabited by the aboriginal Nagas and other semi-savage people, whose incessant raids into the more orderly British provinces occasioned much trouble from 1832 down to 1881. In that year their country was made an administrative district, and garrisoned with a native regiment.

Nagar. See BEDNOR.

Nagasaki, a seaport of Kyûshû, Japan, and for more than two centuries the only gate of communication for that empire with the outer world. Its harbour, famous for its beauty, is a narrow inlet about 3 miles in length. Near its head, beside the native town, is the low, fan-shaped island of Deshima, where the Dutch factory was situated. From 1637 to 1859 the Dutch traders were immured in this prison of 250 × 80 yards, the monotony of their lives being varied by the arrival of the yearly ship from Batavia, and the annual journey to Yedo, when presents were made to the Shôgun. Chinese traders were also permitted to carry on a limited trade. In 1859 Nagasaki became one of the five open ports. The great Takashima coal-mine, situated on an island 8 miles seaward of

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the entrance to the harbour, serves to give importance to Nagasaki as a coaling station. Nagasaki also possesses a fine dockyard and patent slip. The foreign settlement is situated on the flat land at the east side of the harbour. The Roman Catholic Church has a strong mission here, and in one of the valleys in the neighbourhood is a community of historical native Christians. Protestant missions are represented by the English Church Missionary Society, and the American Methodist, Episcopal, and (Dutch) Reformed Church missions. At the mouth of the harbour is the small island of Pappenberg (Takaboko), from which 300 Christians are said to have been hurled in the frightful persecutions of the 17th century. Pop. (1889) 38,229.

Nagina, a town in the North-west Provinces of India, 48 miles NW. of Moradabad. Pop. 20,503.

Nagpur, a city of British India, the seat of administration for the Central Provinces, 450 miles ENE. of Bombay by rail. It lies embosomed in trees, has several handsome tanks, gardens, and temples, and extensive suburbs, but is not a healthy city, the mean temperature being 78°·7 F. Fine cloth fabrics are woven, and there is an active trade in wheat, salt, spices, and European goods. Here, on the 26th and 27th November 1817, a British force of 1350 men, commanded by Colonel Scott, defeated a Mahratta army of 18,000 men. Pop. (1872) 84,441; (1881) 98,300.—The *district* of Nagpur has an area of 3786 sq. m. and a pop. (1881) 697,356; the *division*, 24,040 sq. m. and 2,758,056 pop.—Chota Nagpore (q.v.) is a division of Bengal.

Nag's Head Consecration, a calumnious legend first circulated by Roman Catholics forty years after the event with respect to Archbishop Parker's consecration (1559), to the effect that he was consecrated in the most casual and irregular manner in the Nag's Head Tavern, Cheapside. The facts of the case are that the election took place in the chapter-house at Canterbury, the confirmation at St Mary-le-Bow's Church in Cheapside, and the consecration in the chapel of Lambeth Palace, the consecrating bishops being Barlow, Scory, Coverdale, and Hodgkin.

Nahant, a summer-resort on a small, rocky peninsula of Massachusetts Bay, 12 miles NE. of Boston. Pop. 808.

Nahum. The seventh of the twelve minor prophetical books of the Old Testament is inscribed: 'The burden of Nineveh. The book of the vision of Nahum the Elkoshite.' The opening verses speak (i. 2–8) in general terms of the certainty and awfulness of the divine judgment against the enemies of God, and of his unfailing goodness to those who put their trust in him; these principles are then applied (i. 9–15) on the one hand to some power, not yet named, 'that imagineth evil against the Lord;' and, on the other, to Judah (i. 15), who, though now afflicted, is to be afflicted no more. The second chapter opens with a rapid sketch of a military armament—the red shields, scarlet uniforms, flashing chariots, brandished spears—hurriedly summoned for defensive war; then Nineveh, first named in ii. 8, is seen as a ruined site which an inundation has swept bare, and the great spoil of the 'dwelling of the lions' is indicated rather than described. The subject is continued in the concluding chapter, which predicts for the bloody city, full as it is of lies and rapine, the same fate as has already overtaken 'populous No' (iii. 8) or No-ammon, the Egyptian Thebes. The date of the prophecy must thus be placed somewhere between the fall of Thebes—i.e. not earlier than 666 B.C., and that of Nineveh—i.e. not later than 606 B.C. The explanation of i. 11 by former interpreters as alluding to Sennacherib is thus excluded; the reference must rather be to some actual or threatened invasion of Judah in the reign of Manasseh, and most probably to that of Assurbanipal about 647 B.C., in which Manasseh was himself carried into captivity. The prophecy is written in classical Hebrew, and is characterised by a bold and vivid originality of style, if also by a conciseness sometimes bordering on obscurity; in more than one expression it has been thought that the writer betrays personal acquaintance with Ninevite affairs, and it is conjectured that he may have been either an Israelite of the northern kingdom who in early youth had been deported after the fall of Samaria, or a Judæan who had been carried captive along with Manasseh. Of his personal history nothing is actually known; the name, which is not a very common one, reappears in Luke, iii. 25, and in the name of the Galilean Capernaum ('village of Nahum'). He is described as a native of Elkosh, by which perhaps is to be understood the modern El-Kauseh, near Ramah in Upper Galilee, though others think of Al-Kôsh near Mosul, on the left bank of the Tigris, where the grave of the prophet has been shown since the 16th century. See commentaries by O. Strauss (1853), C. A. Blomquist (1853), F. Gihl (1860), M. Breiteneicher (1861), L. Reinke (1867), and E. Mahler (1886), and works mentioned under HOSEA.

Naiads. See NYMPHS.

Naihati, a town of Bengal, 23½ miles NW. of Calcutta by rail. Pop. 21,533.

Nails are flattened, elastic, horny plates, which are placed as protective coverings on the dorsal surface of the terminal phalanges of the fingers and toes. Each nail consists of a *root*, or part concealed within a fold of the skin; a *body*, or exposed part attached to the surface of the skin; and a free anterior extremity called the *edge*. The skin below the root and body of the nail is termed the *matrix*, from its being the part from which the nail is produced. This is thick, and covered with highly vascular papillæ, and its colour is seen through the transparent horny tissue. Near the root the papillæ are smaller and less vascular; hence the portion of nail corresponding to this part is of a whiter colour; from its form, this portion is termed the *lunula*. It is by the successive growth of new cells at the root and under the body of the nail that it advances forwards, and maintains a due thickness, whilst at the same time its growth in a proper direction is ensured. The chemical composition of the nails is given in the article HORN, to which class of structures they belong. According to the observation of Bean, the finger-nails grow at the rate of about two-fifths of a line in a week, while the toe-nails only grow with about one-fourth of that rapidity. When a nail has been removed by violence, or has been thrown off in consequence of the formation of matter (pus) beneath it, a new nail is speedily formed, provided the matrix has not been seriously injured.

There is a very common and troublesome affection popularly known as *ingrowing nail*. Its most usual seat is by the side of the great toe. It does not in reality arise from any alteration of the nail, but from the adjacent soft parts being constantly pressed by the use of tight shoes against its edge. These parts become swollen and inflamed; suppuration ensues, and an intensely sensitive ulcer is formed, in which the nail is imbedded. Surgical advice should at once be resorted to in these cases, as there is no probability that the ulcer will heal spontaneously, especially if the patient continue to move about, and thus keep up irritation. In obstinate cases it is not unfrequently necessary to

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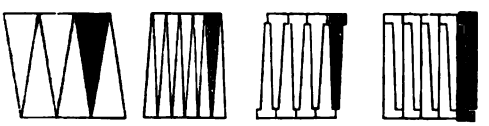
remove a portion of the nail, an operation attended with much pain, although quickly performed.

Nails. The making of nails by hand has been an established manufacture in the Birmingham district for 300 years. Before the successful (but very gradual) introduction of machine-made nails, men, women, and children, to the number of 60,000, were engaged in the industry. They all worked, as nailers who forge nails by hand still do, in small shops or sheds attached to their houses. In 1861, when the number employed at this work had dwindled down to 26,000, nearly one-half were females. At the village of St Ninians near Stirling in Scotland, where within the memory of persons still living 400 hands were employed in forging nails, there are now scarcely a dozen. After the introduction of slitting mills into England in 1865, which supplied nail-rods of the proper section to nail-makers, the trade became localised where it still is and gradually prospered. Iron plates are cut up into nail-rods by a pair of slitting rolls with square grooves on their surface.

In making nails by hand, the nailer heats the end of the nail-rod at his small forge, and brings it into the form of the spike of a nail by a few strokes of his hammer on the anvil. It is then cut to whatever length is wanted on a chisel, leaving it still attached to the rod. Dropping it next into one of two holes in a 'bolster,' and detaching it from the rod, the nailer forms the head from the projecting end by a few more strokes of his hammer, and then the nail is finished. Dies or 'swages' are required for the heads of ornamental nails.

Nail-making machines are complicated and can hardly be understood without a number of illustrations and a lengthy description. We can only name the principal parts of one for making wrought nails from 'ridge' rolled iron plate, which, though not of very recent design, has been much used. From a strip of this sheet or plate, which has a single or double ridge along its edge, the machine cuts the nails crosswise and partially forms the head of each from the ridge at right angles to the spike. These cut pieces or blanks are next moulded to the required form between suitable dies or forming tools, and then other tools come into play to shape and finish the heads. In this process the nails are formed while the iron is heated. A brief description of the machines in use at one of the largest English nail-works is given in the *Engineer*, 3d September 1886.

Cut nails are made from strips of cold iron the breadth of which corresponds to the length of the nail, and the fibre of which runs the long way of the nail. In cut nails the production of shank and point is done at the same time, but an



additional operation is necessary if they require to be headed. The annexed diagram shows how these nails are made without waste of material.

Horseshoe-nails, which are formed of the best charcoal iron, have hitherto been the most difficult to make by machinery, but machine-made nails even of this kind are now rapidly taking the market. A very large proportion of cut nails, as well as other kinds, are now made from Bessemer and Siemens-Martin steel, and the quality of these is superior to most of the old wrought-iron nails. Cast nails are also made for horticultural purposes, and for nailing laths to hold plaster. Some cast nails are annealed, and are then almost as tough as wrought nails. Cast nails are also made in brass. Wire nails, which are of French origin, are made by a machine in which the end of a reel of wire, while held for a moment by cam grippers, receives a blow from a punch to form the head. The wire is then pushed forward the length of a nail and two punches advance to form the point, when a 'knocker-off' throws out the finished nail.

Since 1889 nails have been successfully made in America from tinplate scrap. This substance is sheet-iron, usually of excellent quality, and its coating of tin is an advantage for some, if not for most kinds of nails. Moreover, scraps of it accumulate in large quantity wherever tinplate goods are extensively made. For one size of nail, a blank of tinplate about 1⅛th inch by ⅝th inch is crushed up or flattened edgewise into the form of a nail spike much in the same way as a fan is folded up; or the blank can be rolled up into a round nail. The machine for making these is the invention of Mr G. H. Perkins of Philadelphia, and has passed through several experimental forms. It performs the cutting, crushing, gripping, and heading operations.

Naini Tal, the summer-resort of the lieutenant-governor of the North-west Provinces of India, nestles between spurs of the Himalaya, beside a beautiful lake 6409 feet above sea-level, 70 miles N. of Bareilly. By a disastrous landslip here in 1880, 150 lives were lost. There is a military convalescent depôt. Pop. 6576, but over 10,000 in the season (September).

Nairne, CAROLINA OLIPHANT, BARONESS, song-writer, was born 16th August 1766, at the 'auld house' of Gask in Perthshire, the third daughter of its Jacobite laird. In 1806 she married her second cousin, Major William Murray Nairne (1757–1830), who in 1824, by reversal of attainder, became the sixth Lord Nairne, and to whom she bore one son, William (1808–37). They settled at Edinburgh, and after her husband's death she lived for three years in Ireland, then for nine on the Continent, returning at last to the new house of Gask—the old one had been pulled down in 1801. Here she died, 27th October 1845. Her eighty-seven songs appeared first under the pseudonym 'Mrs Bogan of Bogan' or 'B.B.' in *The Scottish Minstrel* (1821–24), and posthumously as *Lays from Strathearn*. Not a few of them are mere Bowdlerisations of 'indelicate' favourites; but four at least live, and shall live, with the airs to which they are wedded—the exquisite 'Land o' the Leal' (*c.* 1798), and 'Caller Herrin',' 'The Laird o' Cockpen,' and 'The Auld House.'

See Charles Rogers' *Life and Songs of Lady Nairne* (1869), and T. L. Kington Oliphant's *Jacobite Lairds of Gask* (Grampian Club, 1870).

Nairnshire, the fourth smallest county of Scotland, is washed on the north for 10 miles by the Moray Firth, and elsewhere bounded by Elgin and Inverness shires. Till 1891 it consisted of a main body, with a maximum length of 18 miles, a mean breadth of 11, and an area of 169 sq. m., and also of five detached portions situated in Elgin, Inverness, and Ross shires, which, having a total area of 31 sq. m., were annexed to Nairnshire in 1476, but disjoined therefrom by the Boundary Commissioners in 1891. The chief rivers are the Nairn and the Findhorn, the former rising in Inverness-shire, and flowing 38 miles north-eastward to the Moray Firth. The surface has a generally southward ascent from the fertile and well-wooded 'laich of Moray' near the coast, till at Carn Glas on the southern boundary it attains 2162 feet. Loch Loy (1⅛ by ¼ mile) is the largest of seven small lakes. Less than one-fifth of the entire area is in cultivation, more attention being paid to stock than to crops. The chief antiquities are Kilravock (1400)

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and Cawdor Castle (q.v.); at Auldearn, near Nairn, Montrose (q.v.) won his fourth victory. With Elginshire the county returns one member; and with Inverness, &c. Nairn town returns another. Pop. (1801) 8322; (1841) 9217; (1881) 10,455; (1891) 10,019—1990 Gaelic-speaking.

NAIRN, the county town, stands on the west bank of the river Nairn at its mouth in the Moray Firth, 16 miles by rail E.N.E. of Inverness. A pleasant little watering-place, with a small harbour, it was constituted a royal burgh by William the Lion. Grant, the African traveller, was a native. Pop. (1841) 2388; (1881) 4161.

Nairs, a Hindu caste in Malabar, who have peculiar marriage customs, described under Family (q.v.). Colonel H. Drury tells much about the Nairs in his *Reminiscences* (1890).

Nala is a legendary king of ancient India, whose love for Damayantî, the daughter of Bhîma, king of Vidarbha, and the adventures arising therefrom, forms a celebrated episode of the *Mahâbhârata* (q.v.), as also of a separate poem, the *Nalodaya*, attributed to Kalidasa as its author.

Namaquas, the principal existing tribe of the race generally known under the name of Hottentots (q.v.). They inhabit the region called Great Namaqualand, north of the Gariep or Orange River, and the country a few miles south of it, as far as the Kamiesbergen. They are a pastoral people of rather predatory habits, and live under the rule of their chiefs.

GREAT NAMAQUALAND, or NAMALAND, is the extensive region in South Africa north of the Cape Colony, extending from the Orange River to Damaraland (q.v.) northwards, and stretching inland from the west coast to 20° E. long., the borders of British Bechuanaland. Since 1885 a German possession, with the exception of the small British coast territory of Walvisch Bay (q.v.), it has an area estimated at 460,000 sq. m. It is mainly a most sterile and barren region, and along a coast-line of upwards of 400 miles does not present a single running stream; but a few little bays along the coast, such as Angra-Pequeña (q.v.), Sandwich Harbour, and Walvisch Bay, afford safe anchorages. The Rhenish Mission, which has long been active here, has six stations in Namaland with over 2500 converts. There has often been war between Namaquas and Hereros (see DAMARALAND). LITTLE NAMAQUALAND is a barren district of Cape Colony (q.v., Vol. II. p. 738), south of the Lower Orange River. Much copper is mined here.

Names are usually classed as either *local* or *personal*, but neither class can be profitably studied apart from the other; since the names of places are frequently derived from the names of persons, while numerous personal names prove ultimately to be derived from local names. Thus, Washington, the capital of the United States, derives its name from George Washington the first president; his name in turn was derived from that of a Durham village where his ancestors resided, and this village itself obtained its name from the Wasings, a Teutonic clan. Names must therefore not be regarded as arbitrary signs—they have a meaning and a history, though owing to the absence of early documents the history may be lost, and the meaning may be unascertainable with certainty.

Local names are usually either descriptive, like Red River; personal, like Charleston; historic, like Point Turnagain; or transferred, like New South Wales. Another broad distinction may be drawn between the names of physical features, such as rivers and mountains, which are frequently the memorials of extinct or very ancient races, and the names of villages and hamlets, which are usually of more recent origin, and to a large extent are derived from the personal names of early settlers. Thus, in the United States, while the Red Men have disappeared, or have been withdrawn to remote reservations, they have left behind them such familiar names as Niagara, Ohio, Potomac, Mississippi, Missouri, Huron, Erie, Michigan, Connecticut, and Massachusetts; while places of habitation bear modern names, like Brownsville, Grantstown, or Madison, derived from the names of settlers or politicians. In England also the names of rivers are chiefly ancient and Celtic, while those of places of habitation are mainly recent and Teutonic. There are four rivers in England called Avon, a word which in Celtic means 'river;' while from the Celtic word *uisge* or *wysg*, 'water,' we derive the names of the Esk, the Usk, the Exe, the Axe, the Ash, and the Wye; and from *dubr*, *dwfr*, or *dur*, 'water,' we have the Dove, the Dovy, and probably the four Derwents; while *tam*, 'wide,' gives us the Tame and the Thames. On the other hand we know that Clapham was the 'home' of the Osgod Clapa, in whose house Harthacnut drank himself to death, while Addlethorpe was the place where Ardulfr settled.

All over Europe local names bear witness to races departed or absorbed. Thus, we find traces of Slavs and Celts in Germany, of Romans and Celts in Gaul, of Phœnicians on the Mediterranean coasts, of Arabs in Sicily and Spain. Not a few names attest the early extension of Phœnician commerce. Such are Malta, 'the refuge;' Catania, 'the little' harbour, in Sicily; Carthage, 'the new town;' Carthagena in Spain is Carthago Nova or New Carthage; Seville is the city 'on the plain;' Malaga, 'the place for salting' fish; Tarragona is 'the palace;' Cordova, 'the olive-press;' and Lisbon, 'the walled' town. Arabic names are naturally more numerous both in Sicily and Spain. In Sicily, besides Marsala, 'the port of Allah,' we have several names containing the word *kalat*, 'a castle,' and *ras*, 'a cape,' such as Caltanisetta, Caltagirone, Calascibetta, Calatafimi; together with Rasicanzir, Rasicalbo, and Rasacarami. In Spain numerous rivers exhibit the Arabic *wadi*, 'a river' or 'valley,' in the Spanish form *Guad*. Such are Guadalquiver, 'the great river;' Guadalaviar, 'the white river;' Guadalupe, 'the river of the bay;' and many others. We find the Arabic article *al* as a prefix in Algeciras, 'the island,' which is the same name as Algiers; as well as in Almanza, 'the plain;' Almaden, 'the mine;' Alcazar, 'the palace;' Alcantara, 'the bridge.' The province of Algarvé means 'the west;' Alcala is 'the castle;' *kalat*, 'castle,' so common in Sicily, reappearing in the names of Calatrava and Calahorra. The word Medina, 'a city,' is seen in Medinaceli and Medina Sidonia; while Gibraltar, 'the mountain of Tarik,' preserves the name of one of the earliest invaders.

French cities, unlike those in England, frequently preserve the Celtic names of the Gaulish tribes of which they were the capitals. Thus, Paris was the capital of the Parisii, Rouen of the Rothomagi, Amiens of the Ambiani, Arras of the Atrebates, Evreux of the Eburovices, Beauvais of the Bellovaci, Lisieux of the Lexovii, Chartres of the Carnutes, Rheims of the Remi, Châlons of the Catalauni, Sens of the Senones, Saintes of the Santones, Soissons of the Suessiones, Troyes of the Tricasses, Limoges of the Lemovices, Poitiers of the Pictones, Tours of the Turones, Cahors of the Cadurci, Toulouse of the Tolosates, while Berri was the seat of the Bituriges. Such names are rare elsewhere, but Trêves (Trier) preserves the name of the Treviri, Turin of the Taurini, Venice of the Veneti, Worcester of the Huiccii, Devon of the Damnones.

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The way in which the dominion of Rome was established by the foundation of colonies and privileged cities can be traced over the greater part of Europe. The name of Cologne is a corruption of Colonia Agrippina, Lincoln of Lindum Colonia; Lodi was Laus Pompeii, Pampeluna was Pompelo or Pompeiopolis. Friuli and Fréjus are variant corruptions of Forum Julii, Forli of Forum Livii, Jülich of Juliacum, Lillebonne of Juliabona, Beja of Pax Julia. Badajoz was Pax Augusta, Merida was Augusta Emerita, Saragossa was Cæsarea Augusta. Augsburg, Aosta, Aoust, Augst, and Auch are corruptions of Augusta, Autun of Augustodunum. Klagenfurt was Claudii Forum, Fiora was Forum Aurelii, and Orleans was Aurelia. We find the name of Valentinian in Valenciennes, of Gratian in Grenoble, of Hadrian in Adrianople, of Constantine in Constantinople; while Constance and Coutances bear the name of Constantius. Of the same class are Alexandria, Scanderoon, Antioch, and Seleucia, which recall the dominion of Alexander and his successors.

The Roman cities in Britain are commonly designated by dialectic variations of the Anglo-Saxon *ceaster* (a word derived from the Latin *castra*), which is usually appended to a fragment of the primitive Celtic name. Thus, in the Saxon region we have such names as Winchester, Chichester, Dorchester, Rochester, and Colchester. In Mercia we have Gloucester, Worcester, Leicester, Manchester, and Chester. In the Anglian district we find Tadcaster, Lancaster, Doncaster, and on the Welsh or Cornish frontier Wroxeter and Exeter. But many of our larger towns grew up in post-Roman times near the great fords over rivers; such are Oxford, Hereford, Hertford, Bedford, Chelmsford, Guildford, Stafford, Stratford. That only the smaller streams were bridged is shown by the names of Cambridge, Tunbridge, Weybridge, and Uxbridge.

The nomenclature of Teutonic lands—Germany, England, and north-eastern France—fully bears out the description given by Tacitus of the Germans, 'Nullas Germanorum populis urbes habitari, satis notum est; ne pati quidem inter se junctas sedes. Colunt discreti ac diversi, ut fons, ut campus, ut nemus placuit.' Hence the local names in England and Germany differ essentially from those of Italy, France, Spain, Wales, and Ireland in one important respect. The first element is frequently the name of the Teutonic settler who selected his home in field or forest. Round these isolated dwellings villages grew up, and became known as the *ton*, *ham*, *thorpe*, or *by* of the first settler and his family. Thus, to take a few village-names from a small district in Yorkshire, we find that a man named Asketel settled at Asselby and another at Haisthorpe, Anlaf at Anlaby, Bardolf at Barlby, Dugald at Duggleby, Fulchar at Foggathorpe, Gamal at Ganton, Lambi at Langthorpe, Miöll at Millington, Rether at Raisthorpe, Hrolfr at Rowlston, Thorgrimr at Thornthorpe. In like manner the majority of German village-names are derived from the names of the earliest Teutonic settlers. Thus, we find Hrudulf at Rudelsheim, Rudisleben, and Rüdelshausen; Wolfbert at Wolfertshausen; Dietrich at Dietersheim, Dietershausen, and Dietersdorf; Ratbold at Rappoltsweiler; and Ratbert at Rappertsweiler.

On the other hand, in Celtic lands—Cornwall, Wales, Ireland, Scotland, and parts of France—a more religious spirit has caused the villages more commonly to bear the name of some local hermit or evangelist, or of the saint to whom the church is dedicated. In Teutonic lands such names are rare, and, as in the case of St Albans or St Edmundsbury, St Gallen or Glarus (St Hilarius), they commonly refer to a town which has grown up under the shadow of some great monastery. In many parts of France such names are more common, as in the case of St Omer, St Denis, St Cloud, St Malo, St Privat, St Didier, St Cyr, and about 6000 other names. In Ireland some 2700 names begin with *Kil*, which denoted a 'church,' or a monastic 'cell.' Thus Kilkieran is the church or cell of St Ciarran, Kilkenny of St Cannech, Kilbride of St Brigid, Kilskeer of St Seire, Killaloe of St Lua or Dalua, and Kilkee of St Caeide. In the Celtic part of Scotland we have a fair number of such names, though not so many as in the Isle of Saints; such, for instance, are Kilmarnock, Kilfinan, Kilpatrick, and Kilsyth. *Kirk* ('church') is common in the Teutonic part of Scotland, as in Kirkcudbright, Kirkcaldy, and Kirkpatrick. This prefix is also found in the north of England, where we have 34 villages called Kirby or Kirkby ('church village'). In the south of England *church* occasionally is found as a suffix, as in Bonchurch and Whitchurch; while in Axminster, Kidderminster, Leominster, and Westminster the suffix denotes a monastic foundation. In Wales the ecclesiastical prefix is usually *Llan*, meaning an 'enclosure.' Thus, Llandudno is the church of St Tudno, Llanberis of St Peris, Llangollen of St Collen, Llanfair of St Mary, Llanbadern of St Padern, Llanilltyd of St Illtyd. All the Welsh sees, Llandaff, St Davids, St Asaph, and Bangor ('the white choir'), are named from churches, whereas every English see, except the modern see of St Albans, bears a name of secular origin. A very large number of Indian towns take their names from the temple of some deity; Bombay, for instance, is a corruption of Mambai, a goddess to whom an ancient temple was dedicated, and Calicut is Kali's fortress.

Names derived from conspicuous trees or the nature of the vegetation are everywhere common. From the oak we have such English names as Acton, Acham, and Auckland; such Celtic names as Derry, Kildare, and Darrock; while there are about 200 Slavonic places called Dubrau. Those in England named from the ash, such as Ashby and Ashton, amount to nearly the same number; but there are only 27, such as Appleby and Appleton, named from the apple, and 11 from the birch. The Slavonic name of the birch (*brasa*) gives its name to 40 places; the lime (*lipa*), to upwards of 200, including Leipzig, while in England we have Lyndhurst, Linton, and a few more. We obtain Aldershot and Olney from the alder; Thorney from the thorn; Bromley from the broom; Rusholme from the rush; and Farnham and Farnborough from the fern. Selinus, one of the greatest of the Greek cities in Sicily, took its name from the wild parsley. There are also names from animals; from the fox, for instance, we have Lochmaddy, Todmorden, and Foxholes. Many towns take their names from the rivers on which they stand. In England we have Exeter on the Exe, Axminster on the Axe, Okehampton on the Oke, Taunton on the Tone, Maidstone on the Medway, Plymouth, Dartmouth, and Falmouth on the Plym, Dart, and Fal; while Hull, properly Kingston-upon-Hull, has usurped the name of the river Hull. In Asiatic Russia Tomsk, Tobolsk, and most of the chief towns are thus named.

The commonest suffixes in English place-names, denoting habitation or enclosure, are *-ton*, *-ham*, *-worth*, *-stow*, and *-bury* in the south, and *-by*, *-thorpe*, *-toft*, *-garth*, and *-thwaite* in the north. The patronymic suffix *-ing*, either alone, as in Woking and Barking, or combined with *-ton* or *-ham*, as in Buckingham and Birmingham, Islington and Kensington, denotes the settlement of a family or clan. The more usual suffixes not denoting habitation are *-ey*, *-ley*, *-field*, *-ford*, and *-bridge*. One of the commonest English village-names is

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Newton. There are 120 Newtons, 17 Newbiggins, 12 Newports, 11 Newbolds, 11 Newnhams, and 10 Newcastles. Burton, which means an enclosure on a *burh* or hill, occurs 66 times; Barton (*bere-tun*), a grange or enclosure for corn or barley, occurs 45 times. Hutton, an enclosure on a *hoo* or projecting heel of land, is also very common. There are also 77 Suttons, 57 Nortons, 36 Westons, and 14 Eastons. The settlements of the Danes in Ireland are marked by the names of such important towns as Waterford, Wexford, Carlingford, Limerick, and Wicklow; and three out of the four Irish provinces, Leinster, Ulster, and Munster, where the suffix *-ster* means a settlement or district. In Normandy the Danish suffixes *-by*, *-toft*, *-thorpe*, and *-fleet* appear in the forms of *-bœuf*, *-tot*, *-tourp*, and *-fleur*, as in Marbœuf, Quillebeuf, Ivetot, Clitourps, Harfleur, and Honfleur. The usual suffixes in German names are *-weiler*, *-leben*, *-hof*, *-hausen*, *-heim*, *-dorf*, *-wik*, *-stadt*, *-burg*, *-bold*, *-hall*, *-sitz*, *-ing* or *-ingen*, all of which denote habitation or enclosure, while *-ried* or *-rode* signifies a clearing, and *-wald*, *-holt*, *-feld*, and *-hain* refer to uninhabited places.

In Celtic names, contrary to the Teutonic practice, the substantival element comes first, and the adjectival last. Thus, Cwmbechan is Celtic, Addiscombe is English, Dalry is Celtic, Rydal is English. The commonest element in Irish names is *baile* (Anglicised *bally*), meaning 'a town-land' or 'village,' which is found in the names of 6400 Irish town-lands. Very frequent also are *Lis*, *Rath*, *Dun*, and *Caher*, *Caer*, or *Car*, which denote 'fortified places;' *Bod* and *Tigh* (Welsh *Ty*), 'a house;' *Tre*, common in Cornwall, means 'a village;' *Kil* means 'a church;' *Ath*, 'a ford;' *Coed* and *Coil*, 'a wood;' *Clon*, *Agh*, *Gort*, *Blair*, and *Magh* or *Moy* denote 'fields and plains;' *Ben*, *Pen*, *Cenn*, *Slieve*, *Drum*, *Cefn*, *Bryn*, *Mull* or *Moel*, *Ard*, *Tulla*, *Knock*, *Ros* denote 'hills and ridges;' *Strath*, *Glen*, *Nant* are 'valleys;' *Carrick* or *Craig* means 'a rock;' *Muen* and *Clogh*, 'a stone,' the plural *Cloghan* denoting either 'stepping-stones,' or the 'gravestones' in a churchyard; *Inis* or *Inch* is 'an island;' *Cul* or *Cool*, 'a corner;' *Tober*, 'a well;' *Rhos*, 'a moor;' *Tra*, 'a strand;' and *Lough*, *Loch*, or *Lyn*, 'a lake.' Of the adjectival components the commonest are *mor*, 'great;' *beg*, 'little;' *garw*, 'rough;' *glas* and *liath*, 'green' or 'gray;' *dubh*, 'black;' *gorm*, 'blue;' *buidhe* or *boy*, 'yellow;' *dearg*, 'red;' *gal* and *ban*, 'white.' Thus, Benmore is 'the great hill;' Balfour, 'the cold town;' Ardglas, 'the gray height.'

In Turkish names the commonest components are *koi*, 'village;' *hissar*, 'castle;' *serai*, 'palace;' *kopri*, 'bridge;' *hamman*, 'hot baths;' *bazar*, 'market;' *dagh*, 'mountain;' *bagh*, 'garden;' *su*, 'water;' *ermak*, 'river;' *denghis*, 'sea;' *ili*, 'district;' with the qualifying elements *yeni*, 'new;' *eski*, 'old;' *kara*, 'black;' *ak*, 'white;' *kezil*, 'red;' *ala*, 'beautiful;' *bala*, 'high.' Thus, we have Yeni-koi, 'new village;' Eski-bazar, 'old market;' Kara-su, 'black water;' Ak-serai, 'white palace;' Bala-hissar, 'high castle;' Kezil-ermak, 'the red river;' Ak-dagh, 'white mountain;' Mus-tagh, 'snowy mountain;' Ala-bagh, 'beautiful garden.' Chinese names are usually easy to explain. We have names from colours, such as Hoang-ho, 'yellow river,' and Hoang-hai, 'yellow sea;' from position, such as Nan-king, 'southern capital;' Nan-shan, 'southern mountains;' Ho-nan, 'south of the river;' Yun-nan, 'south of the clouds;' Tong-king, 'eastern capital;' Shan-tung, 'east of the mountain;' or from size, as Ta-kiang, 'great river.'

Countries often take their names from some small district which first became known to the outer world; from some ruling or conquering tribe; or from relative position. Thus, Asia originally denoted only the plain of Ephesus, Africa the plain of Carthage, Europe the plain of Thebes. India derives its name from the people who dwelt on the banks of the Indus; Switzerland from the village of Schwyz; Peru from a small stream near Panama, 800 miles north of the present boundary; Italy from a district in Calabria which first became known to the Greeks; Greece from a tribe in Epirus, probably not of Greek race, who first came in contact with the Romans; Russia from a Finnic corruption of the Swedish name of the vikings who occupied Novgorod; Hungary, Bohemia, and Bavaria from a temporary occupation by Huns and Boii; Scotland from the Scots, an invading Irish sept; England from the Angles; France from the Franks, a German tribe whose chiefs founded the ruling dynasty; Sweden and Denmark from the Suiones and the Danes; Palestine from the Philistines who occupied the portion of the coast which first became known to the Greeks; and Portugal from Oporto, the first part of the modern kingdom to be conquered from the Moors. Spain is the land from which the Phœnicians obtained the skins of 'rabbits;' Brazil is the land which yielded the *braza*, a valuable dye-wood; Poland means 'the plains;' Lorraine takes its name from Lothair, Bolivia from the liberator Bolivar, China from the T'sin dynasty; Japan and Anatolia are both 'lands of the rising sun;' the Deccan is 'the south country;' Norway, 'the northern route' taken by the vikings; Austria is 'the Eastern realm;' Westphalia, the land occupied by the inhabitants of the 'western plain' of the Weser. Northumberland was originally the whole district north of the Humber; Sutherland, Surrey, Suffolk, Sussex, Norfolk, Northampton, Essex, Wessex, and Westmorland are all named from their position.

Nations are frequently called by their neighbours by a name different from that by which they designate themselves. Thus, Germany is a name borrowed by the Romans from the Gauls, and is applied to a country called Deutschland by its inhabitants, who designate themselves as Deutsche, 'the people,' while the Slavs call them Niemiec, which means the 'dumb' or 'unintelligible' people. Their French name is derived from that of the Allemannic frontier tribe; the Magyars call them Swabians, the Finns and Gypsies call them Saxons. The Welsh call us Saxons, while we call ourselves Englishmen. Welsh is a general term meaning 'foreigners,' applied by Teutonic races to non-Teutonic tribes. We apply it to the Cymry, the Germans apply it to Italians. Cornwall, properly Corn-wales, is the land inhabited by the Welsh of the horn; Walloon and Wallachian are Teutonic names used to denote neighbouring races speaking neo-Latin dialects. Those whom we call Lapps call themselves Sabme. Those whom we call Finns call themselves Quains or Suomalaiset, and by the Russians are called Tschuds, which means 'foreigners' or 'barbarians.' The people who call themselves either Slavs, 'the speakers,' or Serbs, 'kinsmen,' were called by the Germans Wends, which means 'foreigners' or 'strangers.'

The map abounds with names which record recent discovery or settlement. The Straits of Magellan, Torres Strait, the Bermudas, the islands of Juan Fernandez and Fernando Po bear the names of Spanish and Portuguese explorers; Cape Horn, the Orange River, New Zealand, New Holland, the Gulf of Carpentaria, and Tasmania or Van Diemen's Land bear witness to the enterprise of the Dutch; Montreal, Detroit, New Orleans, Louisiana, and St Louis to French colonisation in America; Behring Strait bears the name of a Dane in the Russian service; while Hudson Bay, Baffin Bay, Davis Strait, Cook Strait, Bass Strait, Vancouver Island bear the names of

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English explorers. Jamestown, Charleston, Carolina, Albany, New York, and Pennsylvania date from the time of the Stuarts, while Virginia points to an earlier, and Georgia to a later period.

In attempting to discover the meaning of names it is essential to discover the oldest forms—phonetic corruption, assimilation, and popular etymology having often disguised the modern forms beyond recognition. Thus, in the case of Brighton, the ancient form Brihtelmes-stan shows that *Brigh*, the first syllable, is the genitive of the proper name Brihthelm, and that the second syllable is not *ton* but *stone*, the name probably referring to a stone house built by an early Saxon settler. So Thornthorpe is shown by its old form to have nothing to do with the thorn-tree, but to be the thorp of Thorgrimr, while Westow is the 'woman's place.' Drypool is Dritpol, the muddy or dirty pool and not the dry pool; Thixendale takes its name from the sixteen dales which form the township; Durham is an assimilated form from Dunholm, and Stepney from Stebenhithe.

The old dative or locative suffixes which occur in the early forms of so many English and German names have been either disused or assimilated to other usual suffixes. Thus, the locative Wellon ('at the wells') has become Welham, Huson ('at the houses') has become Howsham, Colnun ('at the summits') is now Cowlam, Chillon ('at the springs') has become Kilham, Aclun ('at the oaks') is now Acklam, Fivelac ('five pools') is Filey, and Rodestain ('rood-stone') is now Rudston. These instances may suffice to show that it is of little use to guess at the meaning of the name from mere modern forms; it is only when the ancient form of the name has been recorded that the meaning can be ascertained with certainty.

Personal names as a rule are less obscure in their origin and meaning than local names, but owing to their tendency to transference and migration they are more liable to degradation and mutilation. Thus, John, Gian, Hans, and Ivan are derived from Joannes; Sandy and Alec from Alexander; Jim, Iago, James, and Hamish from Jacob; Beppo, Seppi, Fifine, and Joe from Joseph; Peggy, Gretchen, Maggie, and Madge from Margaret. The origin of most of our names now in common use is either Semitic, Greek, Latin, Teutonic, or Celtic. To these five classes we may therefore direct our chief attention.

The old Semitic names were frequently compounded with the names of deities, as is seen in the names of Babylonian and Assyrian monarchs. The name of Nebuchadnezzar is a prayer, 'Nebo defend the crown;' Nebushasban means 'Nebo save me;' Merodach-baladan is 'Marduk gave a son;' Abednego means 'the servant of Nebo;' Mordecai is 'belonging to Marduk;' Shalmaneser, 'Shalman is favourable.' The names of the Assyrian kings, Assur-bani-pal, Assur-dân, Assur-natsir-pal, contain the name of the eponymous god of Assyria. Many Hebrew names were formed on the same principle. Thus, Obadiah means 'the servant of the Lord' (Jehovah); Abdiel, 'the servant of God' (Elohim); Tobias or Tobiah, 'the Lord is good;' Abijah, 'the Lord is a father;' Ahijah, 'the Lord is a brother;' Jehu, 'the Lord is He;' Nehemiah, 'the Lord comforteth;' Joel, 'the Lord is God;' Elijah, 'God is the Lord.' Many Hebrew names thus compounded, such as Elizabeth, Samuel, Daniel, Josiah, Joshua, and John (Jehohanan, 'whom Jehovah gave;' Gr. *Ioannes*), have become common among ourselves, together with a few, such as Mary, James, Ann, and Thomas, which do not contain the divine names. Modern Arabic names are derived either from those of the Old Testament, as Moussa, Yacoob, Yusuf, Suleiman, and Ayoub (Job); or, like Ali, Hassan, Fatima, and Mohammed, from the family of the Prophet; or from bynames of the Prophet, like Achmet (Ahmed), 'the praised.' Many are compounded with divine titles, like Abd-el-Kader, 'the servant of the Holy One;' or Abd-el-Raman, 'the servant of the Exalted One.'

A Greek, like a Hebrew, bore only one name, though he might be described, for distinction, by the name of his father or of his birthplace, as Thucydides the Athenian, or Alcibiades the son of Clinias. The name of the eldest son was frequently the name or a variation of the name of that of the paternal grandfather. The usage of bearing only a single name led to the great variety of Greek names, in the invention of which much ingenuity was displayed. Such are Aristarchus, 'the best governor;' Agathocles, 'good fame;' Alexander, 'the helper of men;' Philippus, 'the horse lover;' Philemon, 'the lover of thought;' Aristobulus, 'best counsel.' Of similar construction are Demosthenes, Plutarch, Callicrates, Archimedes, Archimachus, Anaxander. There are also patronymics in *-ides*, as Aristides and Anaxandrides.

The Romans seem at first to have borne only one name, but at a very early period they adopted the Sabine practice, using a prenomen or personal name, such as Titus, Quintus, or Marcus, followed by a gentile or tribe name, ending in *-ius*, such as Julius, Claudius, or Tullius. This, in the case of patricians, was followed by a cognomen, usually derived from some personal peculiarity, such as Cæsar, Cicero, Naso, Torquatus. Thus, in the case of Marcus Tullius Cicero, Marcus is the prenomen, Tullius the nomen, and Cicero the cognomen. Occasionally, in the case of distinguished personages, an honorific agnomen, or second cognomen, was added, such as Africanus or Germanicus. A man might be called by the prenomen or the cognomen, or by the prenomen and nomen, or by the prenomen and cognomen. Thus, Caius Julius Cæsar might be called either Caius, or Cæsar, or Caius Julius, or Caius Cæsar, but our modern appellation Julius Cæsar would have been contrary to Roman usage.

The old Teutonic names were compounded of two elements, a substantive and an adjective, usually expressing the characteristics most prized by a fierce and warlike race. The commonest components are *bern*, 'bear;' *wulf* or *ulf*, 'wolf;' *arn*, 'eagle;' *her* or *hari*, 'warrior;' *helm*, 'helmet;' *gar*, 'spear;' *stan*, 'stone;' *wine*, 'friend;' *wald*, 'power;' *mund*, 'protection;' *rath* or *red*, 'counsel;' *grim*, 'fierce;' *hard*, 'stern;' *bald*, 'bold;' *adal* or *ethel*, 'noble;' *hrod* or *rod*, 'glorious;' *bert*, 'bright.' Thus, Bernard is 'the stern bear;' Arnold, 'eagle strength;' Roger, 'glorious spear;' Richard, 'stern might;' Robert, 'glorious brightness;' Albert, 'noble brightness;' Alfred, 'noble peace;' Athelstan, 'noble stone;' Edmund, 'noble protection;' Ethelred, 'noble counsel.'

The Teutonic name system prevailed among the Franks, Burgundians, and Normans in France, the Goths and Lombards in Italy and Spain, as well as in England, Germany, and Scandinavia. Hence we get such French names as Louis (Hlodwig) and Lothair (Hlodochar), with Italian names, such as Humberto and Garibaldi, and Spanish names, such as Gonzalo and Fernando. In England a complete change came in with the Norman conquest. In the early entries in the Durham *Liber Vitæ* we find only such Anglian names as Herebald, Cynbert, Edwin, Arkel, and Bernulf. In the Durham *Boldon* book, compiled about a hundred years after the Conquest, Norman names, such as William, Robert, Walter, and Ralph, are usual among tenants, but the fathers of these men, when their names are recorded, are mostly of the old English type, such as Osbert and Turkil.

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In 1380, when Bishop Hatfield made his survey of the same manors, the old English names had disappeared. No less than 40 per cent. of the men are named John, followed by William with 22 per cent., while, if we add Robert and Thomas, 80 per cent. of all the men's names are accounted for. In the West Riding poll-book of 1379 John also heads the list, and more than half the men are called either John, William, Thomas, or Richard. In the 13th century William is the commonest name, in the 14th and following centuries John is first, with William second, till after the Revolution of 1688 William resumed, and has ever since retained the first place. This popularity of John, a name hardly to be found in Domesday, is believed to be due to the supposed suitability in baptism of the Baptist's name. So Jordan was a name commonly given to children who were baptised in water which had been brought from the Jordan by pilgrims or crusaders. The prevalence of William is due to William the Conqueror, of Robert to sympathy with the misfortunes of his son. Thomas came in with the murder of the great archbishop; the crusading exploits and the imprisonment of Richard I. made the name popular, while to the adventures of the paladins we owe Roland, Roger, and Reginald. In the 14th century Charles, James, and George are almost unknown, and even Henry is unusual. Charles only became popular after the execution of Charles I., and George came in with the Hanoverian dynasty. In the 14th century Mary, Sarah, and Ann, now so common, are scarcely to be found, and Elizabeth usually appears in the form of Isabella. One-third of the women are named either Agnes or Alice. If to these we add Joan, Margaret, Isabella, Cecilia, and Matilda, 75 per cent. of the women are accounted for. The great vogue of Agnes and Alice is explained by popular metrical legends. In the time of Charles I. Agnes has descended from the first place to the tenth, and Alice from the second to the sixth. Ann and Elizabeth now head the list, followed by Jane, Margaret, Mary, Alice, Isabel, Dorothy, and Ellen, in the order named, while Sarah is seventeenth. It may be noted that it was not till after the Restoration that two baptismal names were given to the same person.

Surnames were of very gradual introduction. In the case of Ethelred the Unready, Edmund Ironside, or Harold Bluetooth, we have not surnames, but mere nicknames, which did not descend to the children. Hereditary surnames make their appearance in the 12th century, in the 14th they are usual rather than exceptional, and even now in the mining districts of England and in some parts of Wales they are not universally used. It is easy to detect the process by which surnames were introduced. Thus, at the end of the 14th century we have Richard Johnson, son of John Richardson, where Johnson and Richardson are plainly descriptions or designations, but not true surnames. In the next generation Johnson would become the surname. In the same century we find families whose members are designated as John Smyth, son of Thomas Wright, Agnes Smythwyf, and Alice Smythdoghter. We may detect the origin of such residential surnames as Wood, Green, Lane, Townshend, Yates, and Wells in the descriptive entries John at the Wode, William by the Green, Alice in the Lane, Agnes at the Townend, Richard by the Kirkgate, Thomas atte the Welle. Other names, chiefly those of tradesmen and artisans, indicate recent migration, such as John of Doncaster, or William of York, while among the franklins and esquires we find territorial surnames such as John de Cawood of Cawood. In addition to these residential and territorial surnames, patronymics, such as Jones, Johnson, and Jenkins, are innumerable. There are also nicknames like White, Hogg, and Goodfellow, which have become hereditary; surnames of office, such as William le Mayor and Robert le Falconer; and a very large class of names of occupation. Thus, the surnames Lister, Walker, Dyer, Fuller, Tozer, Tucker, and Webster all refer to the manufacture of cloth; Skinner, Barker, Lorimer, and Sadler to that of leather.

The oldest Celtic names resemble the Teutonic names in their construction. Thus Dumnorix may be translated 'the world king;' Toutorix, 'the tribe king;' Vergobretos, 'the excellent judge;' Cunobelinus (Cymbeline), 'the war chief;' Boadicea, 'the victorious.' At a later time we get names of another description, such as Ruadhri (Anglicised Rory), 'the red;' Buidhe (Anglicised Boyd), 'the yellow;' Cumara, 'the sea-hound' (whence MacNamara); Scolaidhe, now Scully, 'the reciter' or 'story-teller;' Bhaird, now Baird, 'the bard;' Taidhg, now Teague and Tighe, 'the poet;' and Liagh, now Legge, 'the physician' or 'leech.' With the introduction of Christianity we get names of another class, as Taggart (a corruption of *sacerdos*), 'the priest.' From *maol*, 'a tonsured servant,' we have such names as Malone, Malony, and Mulready. Malcolm means 'the tonsured servant of St Columba.' From *giolla* (Anglicised as *gillie*), 'a youth' or 'servant,' we obtain Kelly, 'the servant;' Gilchrist, 'the servant of Christ;' Gillespie, 'the servant of the bishop;' Gilfil, 'the servant of St Paul;' Gilbride, 'the servant of St Bridget;' Gilroy, 'the red-haired servant.' Mag or Mac, 'son,' which in Welsh becomes Map and Ap, has given rise to a host of patronymic surnames. Maclean is Mac-giolla-Ean, 'the son of the servant of John.' Mackay, Magee, and Kay are corruptions of MacAedha; Kegan is MacEgan, Quain is MacIan (Johnson), Kew is MacHugh, Keary and Carey are MacCiardha, Quin is MacCoinn, Quirk is MacCorc, Kane and Caine are MacCathain, Cleg is MacLeagh, Cayley is MacCaolaidhe, and Macpherson means 'the son of the parson.' So in Wales Price and Bryce are Ap Rhys, Powell is Ap Howel, Pugh is Ap Hugh, Parry and Barry are Ap Harry, Bowen is Ap Owen, and Bevan is Ap Evan (Johnson). The Irish *mc*, 'grandson' or 'descendant,' which has become O', has also given rise to innumerable patronymic surnames, but is not found in Scotland or the Isle of Man.

It may be mentioned that in England any one may take another surname or as many surnames as he pleases without either an act of parliament or royal license.

The literature of the subject is very extensive, but for the most part is either obsolete or uncritical. Three painstaking monographs, Förstemann's *Altdeutsches Namenbuch*, Joyce's *Origin and History of Irish Names of Places*, and Moore's *Surnames and Place-names of the Isle of Man*, may be almost unreservedly commended. The *Etymologisch-geographisches Lexicon* of Dr Egli is fairly comprehensive, dealing with more than 17,000 names, and, though not invariably accurate, is a useful book of reference. Dr Taylor's *Words and Places* and Mr Bardsley's *English Surnames* are less technical, and cover a wide field. Lower's *Patronymica Britannica*, Cocheris' *Les Noms de Lieu*, Buttmann's *Die Deutschen Ortsnamen*, Miss Yonge's *History of Christian Names*, Miss Blaikie's *Dictionary of Place-names*, and two books by Mr Ferguson, *Surnames as a Science* and *The Teutonic Name System*, may also be consulted, always with caution, though usually with advantage.

Namur (Flem. *Namen*), a city of Belgium, at the confluence of the Sambre with the Meuse, 35 miles by rail SE. of Brussels. With the exception of the picturesque citadel (1784), the old fortifications have been razed since 1866, their place being taken by a cordon of seven forts. The town itself

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has suffered so much by war that it offers little of interest—the cathedral, completed in 1772, with the grave of Don John of Austria; the Jesuit church of St Loup (1653), a large military school, an antiquarian museum, monuments of Leopold I. and the geologist Omalius d'Halloy (1783–1875), &c. Namur is noted for its cutlery, and also manufactures firearms, leather, paper, and tobacco. Pop. (1874) 26,030; (1889) 28,706. Namur was captured by Louis XIV. in 1692, but recaptured in 1695, after a ten weeks' siege, by William III. and 'my uncle Toby.'

The *province* of Namur, on the French frontier, lying between Hainault and Luxembourg, has an area of 1414 sq. m. Fertile and rich in minerals, it is watered by the Meuse, Sambre, and Lesse, and traversed by wooded spurs of the Ardennes (2000 feet). Pop. (1871) 313,655; (1889) 338,166.

Nanaimo, a town on the east coast of Vancouver Island, 74 miles by rail NNW. of Victoria. There are large coal-mines in the district, and the town is the chief seat of this trade. Pop. of district, 2803.

Nana Sahib, the name under which Dundhu Panth, adopted son of the ex-peshwa of the Mahrattas, became known as the leader of the Indian Mutiny in 1857. Born about 1821, the son of a Brahmin in the Deccan, and educated as a Hindu nobleman, he was bitterly disappointed that when the peshwa died in 1851 the latter's pension was not continued to himself; and, industrious in fanning discontent with the English rule, on the outbreak of the Mutiny he was proclaimed peshwa, and was responsible for the massacres at Cawnpore (q.v., and see INDIA). After the suppression of the rebellion he escaped into Nepal. The date of his death is not known.

Nancy, a beautiful French town, capital of the department of Meurthe-et-Moselle, lies on the left bank of the river Meurthe, at the foot of wooded and vine-clad hills, 220 miles by rail E. of Paris and 94 E. of Strasburg. It comprises, besides several suburbs, the old and new towns (the former with narrow irregular streets, the latter open and handsome). It contains many fine squares and imposing edifices, and owes much of its architectural adornment to Stanislas Leszcinski, who, after abdicating the crown of Poland in 1735, continued to reside here as Duke of Lorraine till his death in 1766. His statue (1831) stands in the Place Stanislas, the principal square, which is surrounded by important public buildings, as the hôtel-de-ville, the bishop's palace, and the theatre. Other noteworthy features are the cathedral (1742); the churches Des Cordeliers and Notre Dame de Bon Secours (1738), both with interesting monuments; St Epvre (1875); the 16th-century ducal palace, with the Lorraine museum; statues of General Drouot (1853) and Thiers (1879); and half a dozen gates, looking more like triumphal arches. The institutions include a university with four faculties, a lyceum, and a library of 40,000 volumes. It has been the main centre of research into the therapeutic value of hypnotism. Nancy, which has grown much in importance since the German annexation of Alsace-Lorraine, has manufactures of cotton and woollen goods, artificial flowers, iron, tobacco, &c.; but its staple industry is embroidery on cambric and muslin. Pop. (1872) 52,565; (1886) 79,020. Nancy, dating from the 12th century, was the capital of the duchy of Lorraine (q.v.). It was the scene of the death of Charles the Bold (1477), and the birthplace of Callot and Claude Lorraine. See works by Cayon (1846), Lepage (1866), and Courbe (1886).

Nanda Devi. See HIMALAYA.

Nandu. See RHEA.

Nankeen Cloth is a very durable fabric made of a kind of cotton grown in China which is naturally of a buff-yellow colour, and this is also the colour of the cloth. The plant which yields it is a mere variety of *Gossypium herbaceum*, the species which yields the ordinary white cotton of India and China. In the first half of the 19th century Nankeen cloth was much used in Great Britain for ladies' and children's attire, and also for men's trousers. It is still exported from China, but is now seldom seen in England. Imitations of it were made in Europe by dyeing white cotton, and the name 'Nankeen,' when now applied, as it sometimes is, to certain kinds of cotton goods manufactured in England, is not confined to fabrics resembling genuine Nankeen cloth.

Nanking, capital of the province of Kiangsu, formerly the capital of China, on the Yangtse River, 130 miles from its mouth. Its name signifies the Southern Capital. Since the removal of the seat of government to Peking (Northern Capital) in the beginning of the 15th century, the official name has been Kiangning, though the old name is preferred popularly. From 1853 to 1864 it was the capital of the Taiping rebels, who destroyed nearly all the magnificent public buildings for which the city was once famous. Previous to that time the walls enclosed an area nearly 20 miles in circumference, and reached in many places an elevation of 70 feet. The most memorable of the ruined buildings were the Porcelain Tower, described under CHINA (Vol. III. p. 186; for illustration, see PAGODA), the summer palace, and the tombs of the kings, with remarkable sepulchral statues. Since its recapture by the Chinese imperialists, Nanking has resumed its position as the seat of the viceregal government, but shows few signs of recovery from its desolation. Although the manufacture of the well-known nankeen, and of satin, has been revived, very little of the pottery, artificial flowers, and paper, for which it was once celebrated, are now produced. The government have, however, established an arsenal on the European model. In 1842 it was captured by the British, and Sir Henry Pottinger signed the treaty of Nanking. Although specified in the treaty of Tientain (1858) as a river-port to be opened to foreign trade, little or nothing has come of this concession. Pop. 150,000.

Nantes, the seventh largest city of France, capital of the department of Loire-Inférieure, lies on the right bank of the tidal Loire (here 2000 yards wide, and joined by the navigable Erdre and Sèvre-Nantaise), 35 miles from the sea, and 248 by rail SW. of Paris. The natural beauties of the site have been much improved by art, and, the old town having been demolished between 1865 and 1870, Nantes is one of the handsomest cities in all France, with its noble river, quays, bridges, shady boulevards, squares, and statues. The unfinished cathedral (1434–1852) contains Colomb's splendid monument (1507) to the last Duke and Duchess of Brittany, and another (1879) to General Lamoricière. The ducal castle, founded in 938, and rebuilt in 1466, was the occasional residence of Charles VIII. and most of his successors, the prison of Cardinal de Retz and Fouquet, and the place where on 15th April 1598 Henry IV. signed the famous Edict of Nantes, which gave freedom of religion to the Huguenots (q.v.), and whose revocation by Louis XIV. on 18th October 1685 drove 400,000 French into exile. Other noteworthy buildings are the splendid church of St Nicholas (1854), the palais de justice (1853), the theatre (1787), and the new post-office (1884), besides a museum, a picture-gallery, and a library of 50,000 volumes. Between 1831 and 1887 £180,000 was

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expended on harbour-works, but the rise since 1845 of the port of St Nazaire (q.v.), near the mouth of the Loire, and the increasing difficulty in the navigation of the river, have combined with depression of trade to reduce the commercial importance of Nantes; to restore which is the object of the ship-canal (1891) between the two places. The chief exports are hardware, cereals, and preserved provisions, the chief imports sugar, iron, cocoa, and wines; and their value respectively in 1872 was £2,200,000 and £2,800,000, in 1889 only £560,000 and £2,100,000. Shipbuilding also has greatly fallen off, but still is one of the leading industries, together with the preparation of sardines, and the manufacture of sugar, leather, iron, nets, soap, machinery, &c.; whilst 10 miles below Nantes is the vast government steam-engine factory of Indret, employing from 2000 to 3000 hands, and familiar to every reader of Daudet's *Jack*. Pop. of Nantes (1872) 112,947; (1886) 120,106. The *Portus Namnetum* of the Romans, and the former capital of Brittany—a rank it disputed with Rennes—Nantes has witnessed the marriage of Anne of Brittany to Louis XII. (1499), the embarkation of the Young Pretender (1745), the 'noyades' of the execrable Carrier (q.v.), the fall of the Vendéan leader Cathélineau (1793), and the arrest of the Duchess of Berri (1832). Fouché was a native. See works by Travers (1844) and Mellier (1872).

Nantucket, an island (15 miles long) off the south-east coast of Massachusetts. On the north shore is Nantucket town (pop. 3727), with a nearly landlocked harbour. It was formerly a great seat of the whale-fishery, but is now mainly noted as a summer-resort.

Nantwich, a market-town of Cheshire, on the Weaver, 4 miles SW. of Crewe. It has some quaint old timber houses; a fine cruciform parish church, Early English to Perpendicular in style, with a central octagonal tower, 110 feet high; a Gothic town-hall (1858); a market-hall (1867); a grammar-school (1611); and brine-baths (1883). The *Halen Gwyn* ('white salt town') of the Welsh, Nantwich was once the second largest town in Cheshire, the seat of 300 salt-works in Leland's day, a number reduced to 100 through the discovery of better brine-pits in other parts of the Weaver's valley in 1624, since which date the industry has gradually quite died out. Boot and shoe making now is the principal industry. A great fire (1583), and its siege by the royalists under Lord Byron (1644) are the chief events in the history of Nantwich. Pop. (1851) 5424; (1881) 7495. See works by Platt (1818) and Hall (1885).

Naphtha is derived from the Persian word *nafata*, 'to exude,' and was originally applied to liquid hydrocarbons which exude from the ground in the neighbourhood of the Caspian Sea; in like manner it was applied to the natural oils found more or less plentifully in nearly all countries of the world, and also to the oil distilled from Boghead mineral in Scotland. But the inconvenience and danger of classing all these oils indiscriminately as naphthas became apparent after the Scotch paraffin and the American petroleum refined oils began to be used for domestic illumination. The word naphtha is still used in a very general and vague sense, and has no specific application either scientifically or commercially to any particular liquid; but since the more general application of the words paraffin and petroleum to mineral oils the sense in which the word naphtha is used has been narrowed considerably. The various British Petroleum Acts since 1862 have also aided in the interest of public safety in emphasising the wise distinction now made between the heavier and safe hydrocarbon oils on the one hand, and the volatile and unsafe hydrocarbon spirits or naphthas on the other.

Commercially, naphtha is now understood to apply to the inflammable distillates of crude mineral oils and coal-tar. For trade convenience the volatile distillates of petroleum and shale oil are known respectively as petroleum spirit and shale spirit, to distinguish each from the other, and both from coal-tar naphtha. The term naphtha also embraces distillates of india-rubber, bones, peat, and wood, the last of these being known as wood-spirit or methyl alcohol. A few words with regard to each of these naphthas may serve to indicate more particularly the nature and method of production, and also the uses to which they are applied.

Petroleum spirit is obtained from crude petroleum in the process of refinement by distillation. The first or lightest portion of the oil which passes over from the still, being highly inflammable, is not allowed to mix with the burning oil, but is run into a separate or naphtha tank. American crude petroleum yields from 15 to 20 per cent. of crude naphtha, which in some of the refineries is separated into gasoline, sp. gr. ·640 to ·650; benzine, sp. gr. ·670 to ·710; and benzoline or deodorised spirit, sp. gr. ·710 to ·730. Russian crude petroleum yields a comparatively small proportion of naphtha, about 5 or 6 per cent., which is separated into light benzine and heavy benzine, varying in sp. gr. from ·730 to ·775. Shale spirit is a product of the crude oil distilled from shale, which is one of the important mining and chemical industries of Scotland. This crude oil contains 4 to 5 per cent. of naphtha, having a sp. gr. of ·715 to ·740; but some of the shale-oil works produce a small quantity of gasoline with a sp. gr. of ·640 to ·680. Coal-tar naphtha is distilled from the tar obtained from coal in gas-works. The production of tar is 10 to 12 gallons per ton of coal put through the retorts. This tar on distillation yields from 5 to 20 per cent. of naphtha according to the quality of coal used. Gas-tar from Newcastle coal gives only 5 per cent. of naphtha, while the tar from some cannel coals yields as much as 20 per cent. Coal-tar naphtha has a sp. gr. varying from ·850 to ·950, and is thus much heavier than the naphthas obtained from crude mineral oils. Coal-tar naphtha may be fractionated into a variety of hydrocarbons with boiling-points ranging from 175° to 350°; but the two of the greatest commercial importance are benzole and ordinary naphtha. Caoutchine is a naphtha obtained by the destructive distillation of caoutchouc or india-rubber. It also may be fractionated into a number of hydrocarbons of different densities and boiling-points. Bone-naphtha is obtained by the distillation of bones in the manufacture of animal charcoal. It is known also as bone-oil, or Dippel's animal oil. Owing to some neutral or nitrogenous substance as yet unknown, it possesses a peculiarly offensive smell, and until some easy means is discovered of removing this very objectionable feature bone-oil can never become of much use as a naphtha. The crude naphthas obtained from these various sources are all refined or purified by similar processes—viz. simple redistillation by means of steam, as in America, for the lightest fractions; but for the heavier spirits a treatment with sulphuric acid and then with caustic soda, and a subsequent washing with water are necessary previous to redistillation.

The uses to which in the industrial arts the different qualities of naphtha are applied are very numerous. The lighter spirits, such as benzole and benzine, being solvents of grease and oil, are used for detergent purposes. Benzoline was for some years burned pretty generally by the poorer classes

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in cheap benzoline or sponge lamps; but its use in this way has happily been greatly restricted, if not quite superseded, by the low price at which petroleum and paraffin oils have for some years been obtainable. The light naphthas are also used for extracting the perfumes of flowers and plants, and the oil from various seeds. Gasoline is employed exclusively for carburetting air-gas. The bulk of the coal-tar naphtha, and much of the shale and petroleum spirit, are employed as solvents in the manufacture of india-rubber and gutta-percha goods. They are also solvents of wax, and fatty and resinous bodies generally, and are so used in refining the best qualities of paraffin wax. Large quantities are consumed in naphtha, torch, and other flaring lamps for outside use. They are also used as a substitute for turpentine in the preparation of paints; and in Scotland the solvent action of shale spirit is turned to account in the preparation of an anti-damp or stone- and timber-preserving fluid called Alexinoton. A considerable percentage of paraffin wax is dissolved and held in solution by the spirit; and if this liquid be applied to freestone, brick, or wood, it passes into the pores of the material, and the spirit rapidly evaporating leaves the wax permanently in the stone or wood, so that water cannot be absorbed by it. While for these various purposes all the naphthas produced in Britain find a ready market, in America and Russia petroleum spirit is made in such quantities that it is impossible to find profitable outlets for it all; and although large quantities in many petroleum refineries are consumed as fuel under the stills, yet much of the crude naphtha has to be burned in waste pits to get rid of it.

Naphthalene, $C_{10}H_8$, is a solid substance obtained from Coal-tar (q.v.). It forms thin, transparent, brilliant plates with a pearly lustre and unctuous to the touch. It melts at 176° (80° C.) and boils at 422° (217° C.), but it readily sublimes at a much lower temperature. Although not very inflammable, it is used (as in the Albo-carbon light) to increase the illuminating power of coal-gas, the naphthalene being placed in a metal receiver heated by the gas-flame, and the illuminating gas passed slowly through. A smoky but brilliant light is thus obtained which under some circumstances may be useful. Naphthalene is of most importance from a scientific standpoint. Its molecule of $C_{10}H_8$ may be regarded as made up of two aromatic nuclei, having two atoms of carbon in common; but for further information on this point, see AROMATIC SERIES. Naphthalene forms an extensive series of derivatives in which one or more atoms of hydrogen are replaced by NO_2—chlorine, bromine, &c.

Napier, the chief port and city of the provincial district of Hawke's Bay, New Zealand, on the east coast of the North Island. Port Ahuriri (or Scinde Island), where most of the wholesale stores are situated, is within the municipal boundary. A railway, intended eventually to connect with Wellington, was open to Woodville (97 miles) in 1889. The harbour has been deepened in order to accommodate large vessels. There is a considerable export of timber and wool, tinned and frozen meat. The exports for the year ending June 1888 amounted to £738,652 (wool, £589,576). It is the seat of the bishop of Waiapu. Pop. (1889) 8597.

Napier, SIR CHARLES, English admiral, was cousin to the hero of Sind and the historian of the Peninsular war, and was born 6th March 1786, at Merchiston Hall, near Falkirk. At thirteen he went to sea as a naval volunteer. In 1808 he received the command of the *Recruit*, 18 guns, and had his thigh broken by a bullet. He kept up a running fight in the West Indies with a French line-of-battle ship, and assisted in her capture. This obtained him a post-captaincy; but being thrown out of active service, he served ashore as a volunteer in the Peninsular army, and was wounded at Busaco. Commanding the *Thames* in 1811, he inflicted an incredible amount of damage upon the enemy in the Mediterranean. In 1814 he led the way in the hazardous ascent and descent of the Potomac; and he took an active part in the operations against Baltimore. In 1829 he received the command of the *Galatea*, a 42-gun frigate, and was employed 'on particular service' on the coast of Portugal. Becoming acquainted with the leaders of the Constitutional party, he accepted the command of the fleet of the young queen; and by defeating the Miguelite fleet he concluded the war, and placed Donna Maria on the throne. He was made admiral-in-chief of the Portuguese navy, and attempted to remodel it; but official and corrupt influence was too strong for him, and he returned to England. In the war between the Porte and Mehemet Ali he organised a land force, with which he stormed Sidon and defeated Ibrahim Pasha among the heights of Mount Lebanon. He took part in the naval attack on Acre, blockaded Alexandria, and concluded a convention with Mehemet Ali. In 1847, now a K.C.B., he received the command of the Channel fleet. When the Russian war broke out he was sent out to command the Baltic fleet; but the capture of Bomarsund failed to realise the high expectations formed, and he was deprived of his command. He twice sat in parliament, for Marylebone and Southwark, and, until his death at his Hampshire seat, Merchiston Hall, November 6, 1860, he laboured to reform the naval administration. See his *Life and Correspondence* (1862).

Napier, SIR CHARLES JAMES, the conqueror of Sind, was great-grandson of the fifth Lord Napier and a descendant of Napier of Merchiston. He was born at Westminster, 10th August 1782, and, having received a commission in his twelfth year, served in Ireland during the rebellion. He commanded the 50th Foot during the retreat on Coruña; and at the fatal battle in which Sir John Moore fell he was wounded in five places and made prisoner. Marshal Ney dismissed him, with permission to go to England, where he engaged in literary work, and even wrote an historical romance. In 1811 he returned to the Peninsula. At Coa, where he fought as a volunteer, he had two horses shot under him. At Busaco he was shot in the face, having his jaw broken and his eye injured. He recovered in time to be present at the battle of Fuentes d'Oñoro and the second siege of Badajoz. He took part in a fighting cruise off the Chesapeake, capturing American vessels, and making frequent descents upon the coasts. He did not return to Europe soon enough for Waterloo, but was engaged in the storming of Cambrai, and accompanied the army to Paris. After the peace he was, in 1818, made governor of the island of Cephalonia, the affairs of which he administered with great energy and intelligence; but, being of an excessively combative disposition, he became embroiled with the authorities at home. In 1838 he was made a K.C.B., and in 1841 was ordered to India to assume the command of the army of Bombay against the ameers of Sind. His destruction of a fortification called Emann Ghur, in 1843, was a most remarkable military feat. The fearful battle of Meeanee (q.v.), on 17th February, followed, where Napier, with 2800 English and sepoys, defeated 22,000 Baluchs, strongly posted. The ameers surrendered, except Shere Mohammed, who brought 25,000 men into line of battle at Hyderabad. Napier had only 5000 men, but in three hours his little army gained a decisive victory. A few days afterwards Napier was in the palace

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of the ameers, and master of Sind; and after the annexation Lord Ellenborough made him governor of Sind. He gained the respect and reverence of the inhabitants, but soon became engaged in an acrimonious war of despatches with the British authorities. In 1847 he returned to England. After attending a series of festivals in his honour, he lived in retirement until the disasters of the Sikh war caused the eyes of his countrymen to be turned to the hero of Sind. He went to India, but found on his arrival that the Sikhs had been routed. He now turned his attention, as commander-in-chief of the army in India, to the subject of military reform, and quarrelled with Lord Dalhousie. He bade a final adieu to the East in 1851, and returned to his native country, where he resided until his death, which took place at his seat, at Oaklands, near Portsmouth, on 29th August 1853. He had then attained the rank of lieutenant-general, was G.C.B., and colonel of the 22d Foot. It must be remembered to his honour that he was the first English general who ever recorded in his despatches the names of private soldiers who had distinguished themselves, side by side with those of officers. Brave to rashness, ready alike with tongue, pen, and sword, quarrelsome with his superiors, but beloved by his soldiers, and, to crown all, of wild yet noble and striking appearance, Napier was one of the most remarkable men of his time. See the biography by his brother (4 vols. 1857), that by W. Napier Bruce (1885), and the short Life by Sir W. Butler (1890).

His brother, SIR WILLIAM FRANCIS PATRICK NAPIER, K.C.B., was born 17th December 1785, served in the Peninsular campaign, and became lieutenant-general. Besides his famous *History of the War in the Peninsula* (6 vols. 1828–40), he published *The Conquest of Scinde* (1845), and the Life of his brother Sir Charles (1857). He died at Clapham, 12th February 1860. See his Life by H. A. Bruce (1864).

Napier, JOHN, Laird of Merchiston, was born at Merchiston Castle, near Edinburgh, in 1550. He matriculated at St Andrews in 1563, and travelled for some time on the Continent, returning to his native country highly informed and cultivated; but, declining all civil employments, he preferred the seclusion of a life devoted to literary and scientific study. In 1593, however, he was one of a deputation of six to the king regarding the punishment of the 'Popish Rebels;' and in the same year he published his *Plaine Discouery* (or 'Interpretation') *of the whole Reuelation of Saint John* (revised ed. 1611; 5th ed. 4to, 1645). In the dedication to King James VI. he gave his majesty some very plain advice regarding the propriety of reforming his 'house, family, and court;' and the work went through numerous editions in English, Dutch, French, and German. In July 1594 he made a contract with Logan of Restalrig for the discovery of treasure in Fast Castle. About this time he seems to have devoted much of his time to the invention of warlike machines for the defence of the country against Philip of Spain, and a list of the same exists at Lambeth Palace, dated 1596. Like other eminent men of the time, Napier, though a strict Presbyterian, seems to have been a believer in astrology and divination. In 1596 he proposed the use of salt as a fertiliser of land. In 1614 he first gave to the world his famous invention of Logarithms (q.v.), in a treatise entitled *Mirifici Logarithmorum Canonis Descriptio* (4to, Edin.). Napier's next work was *Rabdologiæ seu Numerationis per Virgulas libri duo* (Edin. 1617), detailing an invention for simplifying and shortening the processes of multiplication and division mechanically by means of the device subsequently known as *Napier's Bones*—an arrangement of narrow slips of bone, ivory, metal, or pasteboard, inscribed with figures. This ingenious contrivance, however, was superseded by his logarithms. He also prepared a second work on logarithms, showing their mode of construction and application, with an appendix containing several propositions of spherical trigonometry, and those formulæ which are now known by his name. This work was published after his death (4th April 1617) by his son Robert in 1619. There is an English translation by W. R. Macdonald, *The Construction of the Wonderful Canon of Logarithms*, with a catalogue of the various editions of Napier's works (1889). Napier's eldest son, Archibald, was raised to the peerage as the first Lord Napier by Charles I. in 1627, and his descendants still bear the title—the ninth Baron Napier having in 1872 become also Baron Ettrick in the peerage of the United Kingdom.

Two Lives of Napier have been published, the one by the Earl of Buchan (1787), and the other by Mark Napier (1834), who also edited *Ars Logistica*, 'The Baron of Merchiston his booke of Arithmeticke and Algebra' (1839), reprinted from a manuscript copy for the Bannatyne Club. This work had been originally transcribed from Napier's notes by his son Robert.

Napier, MACVEY, born at Glasgow, 11th April 1776, was educated there and in Edinburgh, and in 1799 became a writer to the Signet, in 1805 Signet Librarian (which post he retained till 1837), and in 1824 first professor of Conveyancing. He edited the supplement to the fifth edition of the *Encyclopædia Britannica* (6 vols. 1816–24), and in 1829 succeeded Jeffrey as editor of the *Edinburgh Review* (q.v.). Among his contributors were Macaulay, Carlyle, J. S. Mill, Sir William Hamilton, and (alas for the editor!) Brougham. He died 11th February 1847. See his interesting *Correspondence* (1879).

Napier of Magdala, LORD. Robert Cornelis Napier was born in Ceylon, 6th December 1810, and was educated at the Military College at Addiscombe. He entered the Bengal Engineers in 1826, served in the Sutlej campaign, was wounded while acting as chief-engineer at the siege of Multan, and had a prominent share in the battle of Gujrat. As chief-engineer of the Punjab, with the rank of colonel, he greatly developed the resources of the country. During the Indian Mutiny he was chief-engineer in Sir Colin Campbell's army, and especially distinguished himself at the siege of Lucknow, and was made K.C.B. He received the thanks of parliament for his services in the Chinese war of 1858. As commander of the expedition in Abyssinia (q.v.) in 1868, he achieved a brilliant success, both by his whole management of the short campaign and in the storming of Magdala, which ended it. On his return he received the thanks of parliament, an annuity of £2000, was made G.C.B., and created Baron Napier of Magdala. In 1870 he was appointed Commander-in-chief of the forces in India, and nominated a member of the Indian Council. In 1876–82 he was governor of Gibraltar, and on resigning was made Field-marshal, in 1886 Constable of the Tower. He died 14th January 1890.

Naples owes its foundation to a body of Greek colonists, two settlements, Palæopolis and Neapolis, existing for many years side by side as one community, Parthenope. In 328 B.C. both were subdued by Rome; from that time Palæopolis disappears, whilst its neighbour was made an ally of Rome. It resisted Pyrrhus, deterred Hannibal, but fell through treachery into the hands of Sulla's partisans (82 B.C.), who massacred the people. Under the empire it was a favourite place of residence for the emperors and the upper classes of Rome, and of the poets Virgil, Statius, Silius Italicus, luxury and pleasure, and its beautiful

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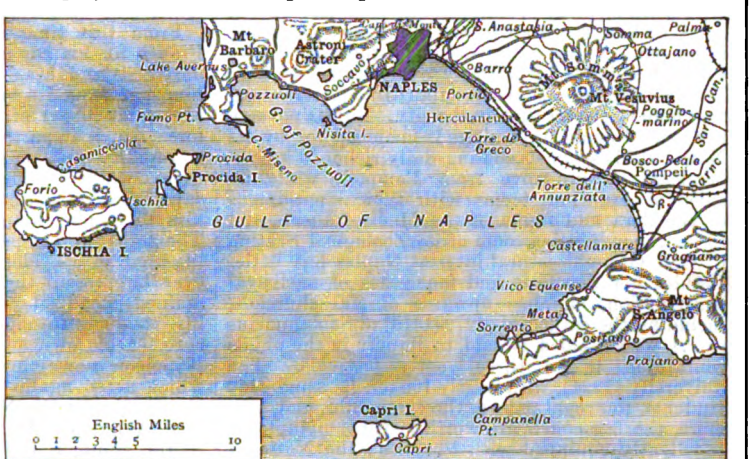
climate, being the sources of attraction. After Rome fell, it sided with the Goths, but was seized by Belisarius (536), and six years later by Totila. Narses recovered it soon after for the Byzantine emperors, who made it the head of a duchy. This in the beginning of the 8th century asserted its independence, and retained it until the whole country was subdued by the Normans (q.v.) in the 11th century. To the Norman dynasty succeeded that of the Hohenstaufen. But their arch-enemies, the popes, conferred the sovereignty of Naples upon Charles of Anjou, who in the battle of Benevento (1266) annihilated the power of the imperial (Ghibelline) party. The predominance of the papal (Guelph) party during the reign of Robert I., who was the patron of Dante and Boccaccio, the depraved libertinism of his heiress and granddaughter Joanna, the ravages committed by German mercenaries and by the plague, futile attempts to recover Sicily, and the feuds of rival claimants to the throne, are the leading features during the rule of the Angevine dynasty, which expired with the profligate Joanna II. in 1435. It was succeeded by that of Aragon, which had ruled Sicily from the time of the Sicilian Vespers (1282). During the tenure of the Aragon line, various unsuccessful attempts were made by the House of Anjou to recover their lost sovereignty; and the country, especially near the seacoast, was repeatedly ravaged by the Turks. Between 1494 and 1504 the French and Spanish disputed between them the possession of Naples, and victory inclined to the latter. Naples was united with Sicily, forming the kingdom of the Two Sicilies, and was governed by viceroys of Spain down to 1707. The most striking episode during this period was the revolt of Masaniello (q.v.). During the war of the Spanish Succession (q.v.), Naples was wrested from Spain by Austria (1707); but in 1735 was given to Don Carlos, third son of Philip V. of Spain, who founded the Bourbon dynasty. In 1789 the troops of the French Republic invaded Naples and converted it into the Parthenopean Republic (1799). For Nelson's share in Neapolitan politics at this time, see NELSON. A second invasion by Napoleon (1806) ended in the proclamation of his brother, Joseph, as king of Naples; and, when Joseph assumed the Spanish crown in 1808, that of Naples was awarded to Joachim Murat. On the defeat and execution of Murat in 1815 the Bourbon monarch, Ferdinand IV., was restored. The insurrectionary movements of 1821 and 1848 were the forerunners of the overthrow of the Bourbon rule by Garibaldi (q.v.) and the Sardinians, and the incorporation of Naples in the kingdom of Italy (1861).



See *History of the Kingdom of Naples* (1734–1825), by Colletta, Eng. trans. by S. Horner (2 vols. Edin. 1858); and see also ITALY, SICILY, and FERDINAND I. and II.

Naples (Gr. and Lat. *Neapolis*, Ital. *Napoli*), till 1860 the capital of the kingdom of Naples, is the largest of Italian cities, and, with the doubtful exception of Constantinople, the most beautifully situated in Europe, 161 miles by rail SE. of Rome. It is the seat of an archbishop. Pop. (1881) 463,172; (1889) 514,286. Naples is one of the busiest ports of the kingdom, exporting wine and olive-oil (£504,150), chemicals and perfumery (£285,800), live animals and animal products (£249,700), hemp and flax (£293,450), cereals (£94,700), curriery (£100,250), &c., to the annual value of £1,672,000; and importing cereals (£1,363,500), metals (£736,800), cottons (£707,250), woollens (£386,300), live animals (£354,900), earthenware, glass, &c. (£336,150), curriery (£256,250), silks (£179,500), groceries (£173,400), specie, hemp and flax, dyes, chemicals, &c., to an average total of £5,563,000. She trades principally with Britain (annual total, £2,266,400) and France (£1,861,900). Naples has many employments but few industries, and these insignificant, consisting mainly of woollen, silk, and linen manufactures, gloves, soap, perfumery, jewellery, earthenware, hats, and carriages. Macaroni (q.v.) is almost indigenous to the Neapolitan seaboard. Fishing supports many of the inhabitants. The neighbourhood is the market-garden of Italy.

Its attractiveness, due not only to its site, but to its tonic and bracing climate, specially delightful in autumn and winter, and, thanks to the sea-breeze, quite tolerable in the summer-heat, has inspired the well-known proverb, 'See Naples and then die.' Its charms have remained proof against innumerable sanitary drawbacks, defective drainage, impure water-supply, and the fever preserves of its poorer quarters with their subterranean dens, in course of removal since June 1889. The impetus to this work was given by the fearful cholera explosion of September 1884, when in one night nearly 2000 people were attacked, and about 1000 of them died. The new drainage-works carry the sewage to Cumæ, thus relieving the sea-margin, under the principal hotels, of the liquid poison that used to stain the water black hard-by the most frequented marine-baths, and infect the oysters moored in baskets near the shore. An aqueduct opened in 1885 furnishes pure drinking-water to every part of the city. Along the quay considerable improvements are in progress—a new harbour, solid embankments, and commodious promenades following up the handsome squares, planted with trees and parterres, new streets cut through the more populous quarters, a fine embankment carried along the sea-front, and the Corso Vittorio Emanuele, a road traversing all the heights above the city—these latter improvements begun and partly finished under King Victor Emmanuel.

Naples occupies the base and flanks of a hill-range rising, amphitheatre wise, from the sea, and divided into two unequal parts by the Capodimonte, S. Elmo, and Pizzofalcone heights, the latter ending in the small ridge crowned by the

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Castel dell' Ovo. The most ancient and populous part of the city lies in the eastern crescent, and is intersected from north to south by the Via Toledo (now Via di Roma), the main historic street of Naples, more densely peopled than any other of equal space in Europe. Numerous broad streets have lately been built on this side of the city. A fine quay extends eastward to the Castel del Carmine. To the back of this lies the poorest and most populous quarter, now being dismantled. Westward runs the less ancient city, smaller in extent, but freer as to air and prospect, and frequented by the more favoured classes, resident and migratory. Along the sea-margin extend the royal gardens and the Riviera di Chiaja, the lower boundary of the comparatively new quarters built against the slope. On the Vomero Hill, in the north-west, house-construction is busily going on to accommodate the inhabitants of the dismantled 'rookeries' near the harbour, for whom dwellings have also been built beyond the railway station to the east of the city. Naples is three miles long and two broad. It has a modern look, but in spite of external change still presents the same noisy, vivacious, mercurial life so astonishing and ere long so oppressive in its monotony to the new-comer from the north. From the precocious street arab to the gray-haired and vociferous mendicant, with a whole army of importunate pedlars, cabmen, newsvendors, flower-girls, and touts between, there is no pause night or day—that 'Naples never goes to bed' is indeed a scarcely exaggerated saying! The historic interest of the suburban quarters along the shore is greater than in the city. But its poverty in Græco-Roman antiquities is made up for by its National Museum, becoming daily richer in archæological treasure-trove from Pompeii, while its splendid aquarium teems with typical specimens of the flora and fauna of the Mediterranean, and forms the exhibition-room of its Zoological Station (q.v.). Of architectural interest Naples has little. Besides her five forts and four gates of mediæval construction, she has upwards of 300 churches, including the cathedral (1272–1316) of St Januarius (q.v.), whose blood is said to liquefy in the phials containing it on three yearly festivals. The university (1224), with nearly 100 teachers and 4150 students, the royal palace, the catacombs, and, still more, the law-courts are worth visiting. Naples is excellently equipped with libraries: the National Library (1804) has 275,000 books and 8000 MSS.; the University Library (1812), 150,000 books; and the Brancacciana (1673), 150,000 books and 3000 MSS. The San Carlo Theatre (chiefly for opera) is one of the largest in Italy, though much less popular than the San Carlino, sacred to 'Pulcinella' (the Italian Punch). In fine art Naples is poor—her music, in spite of her devotion to opera, adding nothing to the European repertory; the plaintive songs of her fishermen are as distinctive of the Mediterranean as the Venetian *barcaruole* are of the Adriatic.—The *province* has an area of 336 sq. m., and a population (1889) of 1,060,032.

Napoleon I., emperor of the French. Napoleon Bonaparte, the second son of Charles Bonaparte and his wife Letizia de Ramolino, was born at Ajaccio, in Corsica, on the 15th August 1769. In 1779 he entered the Royal Military School of Brienne le Château; there he remained till the autumn of 1784, when he was transferred to the Military School of Paris, according to the usual routine. An official report on him by the Inspector of Military Schools in this year speaks highly of his conduct, and notifies his great proficiency in mathematics and fair knowledge of history and geography, but says he is not well up in ornamental studies or in Latin, and, curiously enough, adds that he will make an excellent sailor. Napoleon lost his father in 1785, and the same year he was commissioned as second-lieutenant of artillery, in which capacity he served at Valence and other garrisons. He spent his periods of leave in Corsica, and appears to have wished to play the leading part in the history of his native island, showing the first signs of his ambitious and energetic character. During the critical times following the first French Revolution, he at first joined the moderate party of Paoli; but, trying for military power, though by untiring activity and reckless audacity he succeeded in being elected lieutenant-colonel of the National Volunteers of Ajaccio, he failed in an attempt to seize that town and was obliged to return to France. Although he had forfeited his French commission by overstaying his leave, the second Revolution of 1792 was now in progress, and the new government could not spare the few trained officers whom emigration had left, and his rank was restored to him. He returned to Corsica and accompanied an expedition which unsuccessfully tried to get possession of Sardinia. The French government soon made an endeavour to crush Paoli and do away with Corsican privileges, and the islanders rallied round the patriot. Napoleon now turned against him and attempted to seize the citadel of Ajaccio for the French; but failing again, with all his relatives he fled a second time to France.

From this time onwards Napoleon looked to France for his career. The narrow horizon of his native island was no longer wide enough for him, but from its bracing mountain air and from the quick blood of his race he drew a magnetic force which imparted to his decisions and actions a rapidity and energy that carried all before them, while at the same time a power of calm calculation, of industry, and of self-control enabled him to employ his genius to the best advantage. The force of his personality was so overwhelming that in considering his career the regret must ever be present that the only principle that remained steadfast with him, and is the key to his conduct throughout, should have been the care for his own advancement, glory, and power. Napoleon now joined the army under Carteaux, which acted against the Marseillais who had declared against the National Convention and occupied Avignon. At this time he became attached to the younger Robespierre, who was a commissioner with the army, and embraced his Jacobin principles. He was shortly promoted Chef de Bataillon, and commanded the artillery at the siege of Toulon, where he highly distinguished himself, and is generally believed to have been the author of the plan of attack which led to the fall of the place. He was then promoted general of brigade.

On the fall of the Robespierres, Napoleon incurred serious danger, but was saved by powerful influence enlisted in his favour. He was, however, ordered to take command of an infantry brigade in the Army of the West. This he considered would stifle his military career, and neglecting to obey the order, he was in consequence removed from the list of employed general officers. Disgusted with his apparent lack of prospects, he was now anxious to be sent to Turkey to reorganise the Turkish artillery. But on the eve of the 13th Vendémiaire (5th October 1795) he was appointed second in command of the Army of the Interior under Barras, and did the National Convention good service next day in repelling the attack of the Sections of Paris. Influenced partly by fear and partly by appreciation of his talents, the Directory appointed General Bonaparte to the command of the Army of Italy on 23d February 1796. On 9th March he married Joséphine Tascher

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de la Pagerie, widow of General Vicomte Alexandre de Beauharnais, and left Paris for Italy two days later.

On joining the army Bonaparte inaugurated a new era in the wars of the Republic. Previously the leading motives had been pure patriotism and love of liberty; Bonaparte for the first time, in his proclamation on taking command, invoked the spirit of self-interest and plunder, which was to dominate the whole policy of France for the next twenty years. Evil as were the passions which he aroused, Napoleon's great military genius flashed forth in its full brilliancy in this his first campaign. His power lay in the rapidity and boldness of his decisions, and in the untiring energy with which he carried them out, confounding his enemies by the suddenness and lightning rapidity of his blows, which never gave them time to recover. He found the French army about 36,000 strong, distributed along the crests of the mountains from Nice to Savona, and opposing 20,000 Piedmontese under Colli and 38,000 Austrians under Beaulieu. These two generals had, however, differing interests: Colli's main object was to protect Piedmont, Beaulieu's to cover Lombardy. Hence, if Bonaparte could penetrate the point of junction of the two armies, it was probable they would separate in their retreat, and could be beaten singly. He therefore attacked the centre of the allied line, and, driving back the Austrians from Montenotte on the 12th April, turned against the Piedmontese and defeated them at Millesimo the next day. Losing no time he left a division under Augereau to keep the Piedmontese in check, and led the bulk of his army against the Austrians, defeating them heavily at Dego on the 14th. The allied armies then retreated in diverging directions as expected, and Bonaparte, following the Piedmontese, beat them at Ceva and Mondovi, and forced the king of Sardinia to sign the armistice of Cherasco, leaving him free to deal with the Austrians. He crossed the Po at Piacenza on the 7th May, and obliged the Austrians to retreat to the Adda. Following them he forced the bridge of Lodi on the 11th May, and entered Milan amid the rejoicings of the people on the 15th. But his ill-omened proclamation had done its work; violence and pillage were rampant in the French army, and he could do little to restrain them. Indeed, he himself showed an example of plundering, though under more organised forms. Heavy contributions were exacted, curiosities and works of art were demanded wholesale and despatched to France; and the Directory, demoralised by the unaccustomed wealth that flowed in upon them, became fully as eager as Napoleon for fresh conquests and their accruing spoils. Insurrections followed at Pavia and in the Milanese, but were ruthlessly put down, and on the 27th May the army left Milan to follow Beaulieu to the Mincio. The Austrians defended the whole line of this river, but Napoleon, drawing the bulk of their forces northward by a feint, broke through their centre at Borghetto, and Beaulieu retreated into Tyrol, leaving the line of the Adige to Napoleon. This he at once occupied, taking Verona and Legnago from the neutral republic of Venice, whom he frightened into submission.

The Austrians still held Mantua, which Napoleon now besieged, occupying himself at the same time in consolidating his conquests. The Austrians made strenuous efforts to save the fortress. They had about 20,000 men in Mantua, and Wurmser advanced through Tyrol with 50,000 more, while the French were only some 45,000 strong including the siege corps. Wurmser moved in three columns: one descended the Adige and threatened Verona, another moving between the Adige and the Lake of Garda drove Joubert and Masséna from Rivoli and Corona, while the third under Quasdanovich moved west of the Lake of Garda and seized Brescia, threatening the French communications. Napoleon's position was very critical, but he made a rapid decision, raised the siege of Mantua, spiking his guns and destroying his stores, moved all the force he could collect against Quasdanovich, and defeated him at Lonato on the 31st July. Wurmser moving on Mantua found no enemy there, and missed being at the decisive point at the right time. Napoleon, leaving a small force to watch Quasdanovich, turned rapidly back against the other two Austrian columns which were not yet fully united, and beat their most advanced troops at Lonato again on the 3d August and Wurmser himself at Castiglione on the 5th, driving him back into Tyrol with the loss of half his army. Mantua was again invested, but, the siege-artillery having been lost, the operations against it were reduced to a blockade. In the beginning of September Napoleon took the offensive against Wurmser, and passing boldly behind him defeated him at Bassano, cut off his retreat, and forced him to take refuge in Mantua on the 15th September. Again, at the end of October, an Austrian army of 50,000, but mostly recruits, advanced under Alvinzi. Napoleon could now dispose of from 38,000 to 40,000 men, having in the meantime formed the Cispadane Republic and raised an Italian legion which set free most of his garrisons. Alvinzi arrived before Verona, while a column under Davidovich moved by the eastern shore of the Lake of Garda. Napoleon hastily caused the positions of Rivoli and Corona to be reoccupied to check Davidovich, and moved himself by night from Verona down the right bank of the Adige, crossed it at Ronco, and came upon Alvinzi's rear. Then followed the three days' battle of Arcola, during which Napoleon had a very narrow escape, but which ended in Alvinzi's defeat and retreat on Tyrol. From Arcola Napoleon dated his firm belief in his own fortune. Once again, in January 1797, Alvinzi tried to relieve Mantua. Feinting against Legnago to deceive Napoleon, he intended to make his main advance between the Adige and the lake. But Napoleon was too skilful to take decided action without full knowledge, and keeping his reserve half-way between Rivoli and Legnago waited for more certain news. When he ascertained the direction of the real attack, he moved in full force on Rivoli and won a decisive battle there on January 14, the Austrian detachment on the Lower Adige having to lay down their arms next day at Roverbella. Wurmser capitulated at Mantua on the 2d February, Napoleon treating him with generosity. This first Italian campaign was perhaps the most skilful of all those of Napoleon. Everything was done accurately and rapidly, and without throwing away chances. Some of his later campaigns, though equally brilliant, show him acting more with the gambler's spirit, running unnecessary risks with almost a blind reliance upon his star, in the hope of obtaining results which should dazzle the world.

In political matters during this time Napoleon was acting less as a servant of the French Directory than as an independent ruler. He entirely ignored the instructions he received from Paris, levying contributions, entering into negotiations and deposing princes at his own will, and writing that he is not fighting 'for those rascals of lawyers.' His policy was in fact regulated in accordance with his own ambitious schemes; and we find him adopting a conciliatory attitude towards Rome with an eye to the future support of the church.

When his position in Italy was secured by

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the fall of Mantua, and by treaties with Rome and Sardinia, he prepared to advance through Carinthia and Styria on Vienna. He pushed back the Archduke Charles from the Tagliamento, and advanced till he reached Leoben in Styria on the 7th April 1797. Then Austria sued for peace, and the preliminaries of Leoben were signed on the 18th April pending the conclusion of a definite peace. But further negotiations dragged on, as Austria thought a revolution might be impending in France from which she could obtain advantage. In fact a party was rising against the Directory, consisting mainly of moderates who were eager only for a respectable government, but containing also a few royalists. Their inclusion was fatal to the party. It gave a pretext for raising the cry that the Republic was in danger, and Augereau, sent by Napoleon to Paris, aided the Directory to carry out the *coup d'état* of the 18th Fructidor, when the Corps Legislatif was surrounded by troops and the obnoxious representatives arrested. This strengthened the Directory for the moment, but was a step towards military despotism under Napoleon. Austria, seeing the Directory again firmly seated in power, became more eager for peace, the negotiations were hastened, and on 17th October 1797 the treaty of Campo-Formio was signed. By this France obtained Belgium and the Ionian Islands, Austria also acknowledging the Cisalpine Republic, and ceding to it Lombardy, and engaging to try and get the left bank of the Rhine for France from the Germanic body. As an indemnity Austria obtained Istria, Dalmatia, and the territory of the Venetian Republic, with whom, although neutral, Napoleon had managed to pick a quarrel with this end in view.

Napoleon returned to Paris on the 5th December 1797. The Directory, fearing his ambition, thought they could only keep him quiet by employing him, and gave him command of the so-called Army of England. But he was bent on the conquest of Egypt. He appears to have had something visionary in his temperament, and to have dreamed of founding a mighty empire from the standpoint of the East, the glow and glamour of which seem always to have had a certain fascination for him. He therefore employed the resources of the Army of England to prepare for an expedition to Egypt, and the Directory yielded to his wishes, partly no doubt through the desire of getting him away from France. But their aggressive policy was at the same time fast bringing on another European war. The expedition sailed from Toulon on the 19th May 1798, captured Malta from the Knights of St John by treachery, and, escaping by great luck from the British fleet under Nelson, arrived at Alexandria on the 30th June. The army was disembarked in haste, for fear lest Nelson should arrive, and on the 8th July Napoleon marched on Cairo. He defeated the Mamelukes at Chebreïss and the Pyramids, and entered Cairo on the 24th July. He then occupied himself with organising the government of Egypt, but his position was rendered very hazardous by the destruction of the French fleet on the 1st August by Nelson at the battle of the Nile, and he saw that his dream of founding an empire in the East could not be realised. He thought, however, that he might create a revolution in Syria, by the aid of which he might overthrow the Turkish power and march in triumph back to Europe through Asia Minor and Constantinople. He accordingly entered Syria in February 1799 with 12,000 men, but was brought to a standstill before St Jean d'Acre. Failing to capture that fortress, supported as it was by the British squadron under Sir Sidney Smith, in spite of the most desperate efforts, he was obliged to return to Egypt. The expedition to Syria was disgraced by the massacre in cold blood of 2500 prisoners at Jaffa; but there seems to be some doubt about the truth of the story that in his retreat Napoleon caused the sick he could not transport to be poisoned. After his return to Egypt, Napoleon defeated a Turkish army which had landed at Aboukir, but learning the reverses that had been suffered by the French arms in Europe, he resolved to leave Egypt and return to France. He embarked secretly on the 22d August, leaving a letter placing Kléber in command of the Army of Egypt, and landed in France six weeks later.

He found matters at home in great confusion. The wars had been mismanaged, Italy was almost lost, and the government in consequence was in very bad odour. Siéyès, one of the Directors, meditated a *coup d'état*, but was at a loss for a man of action to take the lead. At this juncture Bonaparte arrived, and, though for some time there was no *rapprochement* between him and Siéyès (the latter fearing Bonaparte's masterful character, and Bonaparte uncertain what party it would be most to his advantage to join), they at length coalesced, and the revolution of the 18th Brumaire followed (9th November 1799), when the legislature was forcibly closed and a provisional executive of three consuls, Siéyès, Roger-Duclos, and Bonaparte, formed to draw up a new constitution. This was promulgated on the 13th December; the executive was vested in three consuls, Bonaparte, Cambacérès, and Lebrun, of whom Bonaparte was nominated First Consul for ten years. He was practically paramount, the two remaining consuls being ciphers, and the other institutions being so organised as to concentrate power in the executive. Siéyès became president of the senate. The governmental crisis being settled, energetic steps were taken with regard to the civil war in the west. A proclamation was issued promising religious toleration at the same time that decided military action was taken, and these measures were so successful that all was quiet at home by the end of February 1800. Then Napoleon turned his attention abroad. He made overtures for peace to England and Austria, now the only belligerents, as he wished to lull suspicion by posing as the friend of peace, not as a military ruler; but he inwardly rejoiced when they rejected his overtures.

The situation of the belligerents on the Continent was this: the Army of the Rhine under Moreau, more than 100,000 strong, was distributed along the Rhine from the Lake of Constance to Alsace, opposed to Kray, whose headquarters were at Donaueschingen in Baden; while Masséna with the Army of Italy was on the Riviera and at Genoa, opposed to an Austrian army under Melas. Napoleon intended to gain himself the chief glory of the campaign; so, giving Moreau orders to cross the Rhine but not to advance beyond a certain limit, and leaving Masséna to make head as best he could against Melas, with the result that he was besieged in Genoa and reduced to the last extremity, he prepared secretly an army of reserve near the Swiss frontier, to the command of which Berthier was ostensibly appointed. Outside and even inside France this army of reserve was looked upon as a chimera. Moreau crossed the Rhine on the 24th April and drove Kray to Ulm, but was there checked by Napoleon's instructions, according to which he also sent a division to co-operate with the army of reserve. Napoleon himself went to Geneva on the 9th May, and assuming command of this army crossed the St Bernard and reached the plains of Italy before Melas had convinced himself of the existence even of the army of reserve, and whilst his troops were scattered from Genoa to the Var. Napoleon's obvious course would now have been to move straight on Genoa, relieve Masséna, and beat

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in detail as many of Melas' troops as he could encounter. But this would not have been a sufficiently brilliant triumph, as the bulk of the Austrian army might have escaped; and trusting in his star he resolved to stake the existence of his army on a gambler's cast. Leaving Masséna to be starved out, he moved to the left on Milan, and occupied the whole line of the Ticino and Po as far as Piacenza, so as to cut off entirely the retreat of the Austrians. He then crossed the Po and concentrated as many troops as he could spare at Stradella. The strategy was brilliant, but the risk run excessive. His army was necessarily scattered, while Melas had had time to concentrate, and he was besides ignorant of the Austrian position. He sent Desaix with a column to seek information, and moved himself on Alessandria, where he found Melas. Next day, the 14th June, Melas marched out to attack the French on the plains of Marengo, and despite all Napoleon's efforts had actually defeated them, when fortunately Desaix returned, and his advance, together with a cavalry charge by Kellermann, changed defeat into victory. Melas, losing his head, signed a convention next day giving up almost all North Italy, though Marmont says that if he had fought another battle he must have won it. Napoleon returned to Paris with the glories of this astonishing campaign; but peace did not follow till Moreau, when his liberty of action was restored to him, had won the battle of Hohenlinden on 3d December 1800. Then followed the treaty of Lunéville with Germany in February 1801, the concordat with Rome in July 1801, and the treaty of Amiens with England in March 1802, so that Napoleon was able to figure as the restorer of peace to the world. He then devoted himself to the reconstruction of the civil institutions of France, employing in this great work the best talent that he could find, and impressing on their labours the stamp of his own genius. The institutions then created, which still remain for the most part, were the restored church, the judicial system, the codes, the system of local government, the university, the Bank of France, and the Legion of Honour.

France at this period, sick of the failure of republican government, was gradually veering towards monarchy, and Napoleon knew how to take advantage of events to strengthen his position, and in due time establish his own dynasty. The plot of Nivose (24th December 1800), when his life was threatened by a bomb, gave him a pretext for arresting and transporting 130 members of the Jacobin party, with which he had long since broken; and after the conclusion of the peace of Amiens a great step was taken when, as a mark of public gratitude for the pacification of the world, he was elected First Consul for life. But though he desired the credit of making peace, so as to enable him to establish his authority over France, when that end was secured he became again eager for war, with a view to further extension of his power. He also desired to humble England, a desire that led to the rupture of the peace of Amiens in 1803. The immediate causes of this rupture were his aggressions in Holland, in the Cisalpine Republic, in Genoa, and Piedmont, and his monstrous demand that England should suppress every print that dared to criticise his actions, and drive all French refugees from her shores. Having thus forced England to resume hostilities, he made vast preparations for her invasion, at the same time taking the first step towards establishing his ascendancy in Germany by seizing Hanover. The assumption of the crown soon followed, Napoleon preparing the way with consummate cunning. He rid himself of Moreau, his most dangerous rival, by accusing him of conspiring with the royalists, into whom he then struck terror by the execution of the Duc d'Enghien. He thus succeeded in inspiring even republicans with the conviction that the best way of preventing the inauguration of a new reign of terror was by confirming his position. He chose the title of emperor as least obnoxious to the republican feeling of the army, and the change was made by a decree of the senate of the 18th May 1804.

Preparations for the invasion of England had been steadily proceeding, but Napoleon's aggressive demeanour after becoming emperor alarmed the European cabinets, so that Pitt was able to revive the coalition, and in 1805 Napoleon found himself at war with Russia and Austria, as well as with England. Forced by England's naval supremacy to abandon the notion of invasion, he suddenly changed front in August 1805, and led his armies through Hanover and the smaller German states, disregarding the neutrality even of Prussia herself, and reached the Danube in rear of the Austrian army under Mack, which was at Ulm. The surprise was complete; Mack surrendered on the 19th October, and Napoleon then marched on Vienna, which he entered on the 13th November. But his position was critical. The Archduke Charles was approaching from Hungary, a Russian army was entering Moravia, and Prussia, incensed at the violation of her territory, joined the coalition. A short delay would have surrounded Napoleon with his enemies, but the Czar was impatient, and the Russian army, with a small contingent of Austrians, encountered Napoleon at Austerlitz, December 2, 1805, and was signally defeated. This caused the break-up of the coalition; the Holy Roman Empire came to an end, the Confederation of the Rhine was formed under French protection, and the Napoleonic empire was firmly established. Napoleon then entered into negotiations for peace with Russia and England, endeavouring to conciliate those powers at the expense of Prussia. The negotiations failed, but Prussia was mortally offended, and mobilised her army in August 1806, about which time Russia finally rejected the treaty with France. Napoleon acted with his usual promptitude, and advanced against Prussia before she could get help either from England or Russia. Although the rank and file of the Prussian armies was good, their generals were antiquated, and Napoleon crushed them at Jena and Auerstädt on the 14th October, and entered Berlin on the 27th. He had then to carry on a stubbornly-contested campaign with Russia. An indecisive battle at Eylau was followed by a hardly-earned French victory at Friedland, 14th June 1807, and the peace of Tilsit ensued, by which Prussia lost half her territory, and had to submit to various humiliating conditions, while Russia escaped easily, and indeed got a share of the spoils.

Napoleon was now at the zenith of his power; he was the arbiter of Europe and the paramount head of a confederation of princes, among whom the members of his own family occupied several thrones. To reward his partisans he at this time created a new noblesse, and lavished upon them the public money. Full of inveterate hostility to England, Napoleon endeavoured to cripple her by the so-called Continental System (q.v.), by which all the states under his influence engaged to close their ports to English ships, and he also tried to combine all the European navies against her; but England, perceiving his aim, took the initiative and herself seized the Danish fleet. The emperor also turned his eyes to the Peninsula, where the dissolute conduct of the Queen of Spain and the intrigues of 'the Prince of the Peace' (see ALCUDIA) gave him an opportunity. He sent an army under Junot to Portugal, and another to Spain, which, under Murat, took Madrid. Napoleon

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then procured the abdication of the king of Spain and placed his brother Joseph on the vacant throne. But he did not foresee the consequences. The spirit of the nation was roused, and a formidable insurrection broke out, while a British army, under Sir Arthur Wellesley, landed in Portugal, defeated Junot at Vimiera, and forced him to sign the Convention of Cintra, evacuating Portugal. So began the Peninsular war which for the future was to paralyse half Napoleon's strength.

In Germany also a spirit of revolt against his tyranny was rising, Austria at first taking the lead, and this brought on the war of 1809 against that power. Prussia, already beginning to recover her strength under the military system of Scharnhorst and Stein (see SCHARNHORST, STEIN), was hostile to Napoleon in sentiment, but was kept down by the pressure of Russia. Napoleon declared war on the pretext that Austria was arming, and marching through Bavaria drove the Austrians out of Ratisbon, and entered Vienna on the 13th May. Eugène Beauharnais, at the head of the Army of Italy, drove the Austrians before him into Hungary, defeated them at Raab, and joined Napoleon. The emperor then tried to cross the Danube, but was checked at Aspern and obliged to retire to the island of Loban. Five weeks of preparation then followed, the peasant war under Hofer being carried on in Tyrol, and then Napoleon made a fresh and successful attempt to cross the Danube, and won the battle of Wagram on the 5th July. This was followed by the armistice of Znaim and the treaty of Schönbrunn, October 20, 1809, by which he obtained a heavy indemnity in money and considerable accession of territory in Carniola, Carinthia, Croatia, and Galicia. But he mortally offended the Czar by giving a large portion of the ceded territory of Galicia to the duchy of Warsaw—i.e. to Poland.

On the 16th December 1809 Napoleon, desirous of an heir, divorced Joséphine, who was childless, and married on the 1st April 1810 the Archduchess Maria Louisa of Austria. He had no doubt the wish also to get a footing in the circle of the legitimate reigning families of Europe. A son, to whom the title of King of Rome was given, was born on March 20, 1811.

Still bent on the humiliation of England, Napoleon now tried to effect his purpose by increasing the stringency of the Continental System, but this ended in bringing him into conflict with Russia. He first annexed the kingdoms of Holland and Westphalia, to give him command of their seaboards, and then prohibited English trade even when carried in neutral bottoms. The Czar, already estranged by Napoleon's alliance with Austria and his conduct as regards Poland, refused to adopt this policy, and the relations between them gradually became so strained that war was inevitable, and Napoleon took the momentous resolve to invade Russia. With Maria Louisa, he arrived at Dresden on the 16th May 1812, and was there greeted by the emperor of Austria, the king of Prussia, and other sovereigns. His army for this gigantic enterprise numbered about 600,000, including French, Germans, and Italians. He crossed the Niemen on the 24th June, reaching Vilna, which was evacuated by the Russians, on the 28th; and he remained at Vilna till the 16th July, hesitating to take the final resolution to invade the heart of Russia. He made overtures for peace to the Czar, who refused to treat as long as an enemy remained on Russian soil. Foiled here Napoleon at last decided to go on with his enterprise; so he advanced, and at first the Russians were in no condition to meet him, their forces being scattered. If Napoleon could have advanced rapidly to Smolensk, he might have cut the Russian forces in two, but his vast host appears to have been unmanageable. Barclay de Tolly and Bagration succeeded in uniting at Smolensk, but were driven from it on the 18th August after an obstinate defence. At Smolensk Napoleon again hesitated as to whether he should go into winter-quarters, but eventually decided to press on to Moscow, trusting to the moral effect of the fall of the ancient capital. It seems as if, while his superstitious belief in his star still remained, bodily ailments had caused a deterioration in his power of rapid decision and in his energy of action. Meanwhile, great discontent had been caused in Russia by the continued retreat of the armies. Kutusoff was appointed to the chief command, and stood to fight at Borodino on September 6. Napoleon won the battle, but with unwonted and misplaced caution refused to engage his Guard, and the victory was almost fruitless.

He entered Moscow on the 14th September, and fire broke out the next night, the first effect of which was still further to alarm the Russians, who believed it to be the work of the French. The fire raged fiercely till the 20th, and a great part of the city was burned to the ground. Had the victory of Borodino been more decisive the Czar might now have yielded; but as it was he listened to the advice of Stein and Sir R. Wilson and refused to treat, thus putting Napoleon in a dilemma. His plans were always made on the basis of immediate success, and the course to be adopted in case of failure was not considered. Again he hesitated, with the result that when at last he resolved to retire from Moscow the winter, coming earlier than usual, upset his calculations, and the miseries of that terrible retreat followed. He left Moscow on the 18th October, and, reaching the Beresina with but 12,000 men, was joined there by Oudinot and Victor, who had been holding the line of the Dwina, with 18,000. His passage of the river was opposed, but he succeeded in crossing, and on the 6th December the miserable remnant of the Grand Army reached Vilna. Macdonald, Reynier, and Schwarzenberg, with 100,000 men, on the Polish frontier and in the Baltic provinces, were safe, but this was the whole available remnant of the 600,000 with which the campaign commenced. It might have been expected that Napoleon would now be anxious for peace, but his haughty spirit could not brook any diminution of his prestige, and, determining to try and efface the past with fresh triumphs, he returned to Paris to raise new levies. The Czar fully understood that no half-measures would be of any avail, but that he must follow up what had been begun and carry the war into Germany the next year, rousing the Germans to his aid. On the 30th December 1812 the Prussian contingent of the Grand Army, under York, came over to the Russians, and on the 22d January 1813 Stein procured the meeting of the estates of East Prussia, when the Landwehr was called out. Saxony also joined Russia, contrary to the wishes of the king, but Austria and the middle states still clung to Napoleon.

Napoleon left Paris for Mainz on the 15th April 1813, his object being Dresden, which was held by the Czar and the king of Prussia. Eugène Beauharnais was on the Lower Saale with 70,000 men, and Napoleon, with 150,000 men, well officered, though raw and short of cavalry, moved to meet him by way of Erfurt. Davoût was holding down insurrection in north Germany with 30,000. The allies at first had only 100,000 available, the process of calling out and drilling the people being slow. Napoleon moved on Leipzig, and won the battle of Lützen on the 2d May, which restored Dresden to the king of Saxony. He then followed the allies, beat them, though with heavy loss, at Bautzen on the 20th and 21st May, and forced

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them to retire into Silesia. The armistice of Poischwitz, signed on the 4th of June, closed the first period of the campaign. Austria then asked for certain concessions, which if Napoleon had granted he might have checkmated the coalition of Prussia and Russia; but he seems to have been unable to bring himself to accede, and contemplated rather war with Prussia, Russia, and Austria combined, to say nothing of England, which was still carrying on the war in the Peninsula. A treaty was signed at Reichenbach on the 14th June, by which Austria engaged as mediating power to offer conditions of peace to Napoleon and to declare war on him in case of refusal. The conditions offered were that he should withdraw from north-west Germany, dissolve the duchy of Warsaw, and cede Illyria. These terms were very moderate, but Napoleon seems to have thought his position insecure without fresh success in war, and procrastinated. An ultimatum was delivered to him on August 8th to which he paid no attention; so on the night of the 10th to 11th August the armistice was declared at an end, and the drama swept rapidly to its crisis.

Napoleon had now 400,000 men along the Elbe from Bohemia to its mouth, but his position was weakened by the adhesion of Austria to the coalition, as she massed her troops in Bohemia, threatening Dresden and his communications. The allies had nearly 500,000 men in three armies, the Austrian under Schwarzenberg in Bohemia, the old Prusso-Russian under Blücher in Silesia, and the bulk of the Prussian force under Bernadotte in Brandenburg. The French armies were discouraged, and the allies enthusiastic; but the latter had difficulties to contend with from their heterogeneous composition and diversity of interests. The campaign opened with varying fortune. A blow at Berlin was parried by Bülow at Gross-Beeren on August 23. Napoleon himself forced Blücher back to the Katzbach, but had to retire again to defend Dresden from the Austrians; and his lieutenant Macdonald was defeated in the battle of the Katzbach on the 26th August. Napoleon inflicted a crushing defeat on the Austrians before Dresden on the 27th, but, while preparing to cut off their retreat, was disturbed by the news of Gross-Beeren and the Katzbach and by sudden illness, and at Kulm lost Vandamme with 20,000 men. September was spent in fruitless marches, now into Bohemia, now into Silesia, and towards the end of the month the allies began their converging march on their preconcerted rendezvous at Leipzig. At the same time the Confederation of the Rhine began to dissolve. The kingdom of Westphalia was upset on the 1st October, and on the 8th Bavaria joined Austria. The toils were closing round Napoleon, and between the 14th and 19th October he was crushed in that battle of the Titans at Leipzig, and, brushing aside the Bavarians who tried to stop him at Haynau, on the 1st November led back the remnant of his army, some 70,000 strong, across the Rhine at Mainz.

The allies now made overtures for peace on the basis of natural frontiers, which would have left France the fruits of the first Revolution—viz. Belgium, the left bank of the Rhine, Savoy, and Nice; but Napoleon could not be content with such curtailment of his power. Evading at first the proposal, he would have accepted it, but with suspicious qualifications, when too late. The invasion of France followed. The allies issued on the 1st December a manifesto saying they were waging war against Napoleon alone, and advanced with three separate armies. Schwarzenberg led the Austrians through Switzerland, Blücher crossed the Middle Rhine towards Nancy, while the northern army passed through Holland. Napoleon had yet hopes of success on account of the forces he still had in the German fortresses, the mutual jealousies of the allies, his connection with the emperor of Austria, and the patriotism which would be aroused in France by invasion. But the allies gave him no time to utilise these influences, and Paris was not fortified. Napoleon carried on a campaign full of genius, gaining what advantage he could from the separation of his enemies. He attacked Blücher and won four battles in four days at Champaubert (February 10, 1814), Montmirail (11th), Château-Thierry (12th), and Vauchamps (13th). These successes would have enabled him to make a reasonable peace, but his personal position forbade this, and he tried subterfuge and delay. The allies, however, were not to be trifled with, and in the beginning of March signed the treaty of Chaumont, which bound them each to keep 150,000 men on foot for twenty years. The battles of Craonne and Laon followed, in which Napoleon held his own, but saw his resources dwindle. On the 18th March the conferences at Chatillon came to an end, and on the 24th the allies determined to march on Paris. Marmont and Mortier, with less than 30,000 men, could make no head against them, while Napoleon himself tried a fruitless diversion against their communications. Joseph Bonaparte withdrew Maria Louisa and the king of Rome to Tours. On the 30th March the allies attacked Paris on three sides, and in the afternoon the French marshals offered to capitulate. Napoleon, when he learned the real state of affairs, hurried up in rear of the allies, but was too late, and had to fall back to Fontainebleau. His position was desperate, and to add to his difficulties Wellington, whose career of success had gradually cleared the French out of the Peninsula, had now led his victorious army across the Pyrenees into France itself.

Napoleon therefore at first offered to abdicate in favour of his son, but, when he found that would not be sufficient, he signed an unconditional abdication on the 11th April 1814. He was given the sovereignty of the island of Elba, and the Bourbons in the person of Louis XVIII. were restored to the throne of France. But the condition of affairs was very precarious. The return of the Bourbons was most unpopular. It indeed restored the parliament, but it unsettled the position of public men and the title to estates. The army was disgusted at the appointment to commands of emigrés who had fought against France. The church began to cause alarm to the holders of national property; and by the release of prisoners and the return of the garrisons of German fortresses very large numbers of Napoleonic soldiers became dispersed over France. The coalition, too, broke up, and fresh alliances began to be sought with a view to check the aggressive spirit which Russia seemed inclined to manifest. Altogether affairs in Europe and France were in such a state as to make it not impossible that the magic of Napoleon's name might replace him in power. He accordingly resolved on making the attempt, left Elba on February 26, 1815, and landed on the French coast on the 1st March. On the 20th he entered Paris, having been joined by the army. He had the advantage of being able to appear as the liberator of France from the yoke put upon her by foreigners, but he could only re-establish his position in the face of the rest of Europe by war, and he was not quite the Napoleon of old, for his physical powers had declined, he had become stout, and had attacks of illness, sleepiness, and indolence. He had been epileptic from his youth. His mind and genius were unimpaired, and his conception of the Waterloo campaign was clear and brilliant as of yore, but the execution failed.

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Europe had declared war against him, and a new coalition had been formed, but only two armies were immediately ready to take the field; a mixed force under the Duke of Wellington in Belgium, and a Prussian army under Blücher in the Rhine provinces. The English army had its base on the sea, and the Prussian on the Rhine, so that they had diverging lines of operation. Napoleon's idea was to strike suddenly at their point of junction before they could concentrate, push in between them, drive them apart, and then defeat each separately. The plan was unexceptionable, resembling that of his first campaign in 1796, and the opening moves were successfully carried out. Napoleon left Paris on the 12th June, his army being then échelonedbetween Paris and the Belgian frontier, so that the point where the blow would fall was still doubtful. On the 15th he occupied Charleroi, and was between the two allied armies, and on the 16th he defeated Blücher at Ligny before Wellington could come to his assistance. So far all had gone well with him; but now apparently his energy was not sufficient to cope rapidly with the difficulties that no doubt beset him through the shortcomings of his staff, and the spirit of mutual distrust that reigned among his officers. He did nothing till the morning of the 17th, and it was not till 2 P.M. that he sent Grouchy with 33,000 men to follow the Prussians in the supposed direction of their retreat towards Liége, and keep them at a distance whilst he turned against Wellington. But he had lost his opportunity; the wasted hours had enabled the Prussians to disappear, and he did not know the fact that Blücher had taken the resolution to move on Wavre, giving up his own communications in order to reunite with Wellington. The latter had retired to a previously-chosen position at Mont St Jean, and received Blücher's promise to lead his army to his assistance. So on the 18th, when Napoleon attacked the Duke, unknown to him the bulk of the Prussian army was hastening up on his right flank while Grouchy was fruitlessly engaged with the Prussian rear-guard only. This led to the crowning defeat of Waterloo, where Napoleon's fortunes were finally wrecked. He fled to Paris, and abdicated for the last time on 22d June; and, finding it impossible to escape from France, he surrendered to Captain Maitland of the *Bellerophon* at Rochefort on the 15th July. He was banished by the British government to St Helena, where he arrived on the 15th October 1815, and died there of cancer of the stomach on the 5th May 1821.

The literature referring to Napoleon may be divided into three categories: First, books dealing with his military and political career by writers contemporary with him or nearly so, such as Thiers' *Histoire du Consulat et de l'Empire;* Jomini's *Vie politique et militaire de Napoléon* (Eng. trans. 1885); Montholon and Gourgaud's *Mémoires pour servir à l'Histoire de France sous Napoléon;* and the memoirs of his generals, such as Marmont, Masséna, and Sachet. Secondly, books touching his private life by contemporaries, such as Bourrienne's *Memoirs of Napoleon Bonaparte;* Las Cases' *Journal of Private Life and Conversations of Napoleon at St Helena;* Forsyth's *History of the Captivity of Napoleon at St Helena, from Letters and Journals of Sir Hudson Lowe;* O'Meara's *Napoleon at St Helena.* These two classes should be read with caution as more or less one-sided. The third class are the modern works written in a more critical spirit, such as Lanfrey's *Histoire de Napoléon I.,* and Colonel Jung's *Bonaparte et son Temps* and *Lucien Bonaparte et ses Mémoires,* Seeley's *Short Life,* and Taine's *Orig. de la France Contemp.—Le Régime Mod.* (vol. i. 1890). Most valuable also is the *Correspondance de Napoléon I.* (32 vols.). See also articles BONAPARTE, CODE NAPOLÉON, FRANCE, JOSÉPHINE, WATERLOO, WELLINGTON.

Napoleon II., king of Rome and Duke of Reichstadt (1811–32), was the son of Napoleon I. and Maria Louisa (q.v.).

Napoleon III., by name CHARLES LOUIS NAPOLÉON BONAPARTE, the second emperor of the French, was born at Paris on the 20th of April 1808. His father was Louis Bonaparte, king of Holland, brother of the first emperor, and his mother Hortense Beauharnais, Napoleon I.'s stepdaughter (see BONAPARTE). Louis Napoleon and his elder brothers were heirs-presumptive to the imperial throne till the birth of a son to the emperor cast them into a secondary position, whence Louis Napoleon, the only survivor, was drawn in 1832, at the death of Napoleon's only son, to become head of the House of Napoleon. That house, astoundingly risen from the nursery of a Corsican lawyer's wife to imperial and royal thrones, thrust back into private life after a complete mastery in Europe, was again raised to imperial dignity in the person of Napoleon III., only to return to obscurity in the midst of appalling disasters; and it failed to present one of the most truly tragic dramas of all time through the want of real grandeur in both Napoleons and in almost all their blood. Had the nephew been born a scion of the Bourbon house, the part of Louis-Philippe might have been his. But brought up by his mother from the year 1815, precluded by exile and imprisonment till he was far advanced in the years of manhood from learning practical politics, he became a theorist in statecraft and a brooder on the Napoleonic legend which was his only claim to the attention of the nation. He received his early education at his mother's residence, the castle of Arenenberg, in Switzerland, on the borders of Lake Constance. Sent to the gymnasium at Augsburg, he not only acquired there, as well as from the prolonged German surroundings of his private life, a marked German accent, but also developed those features in his individual character which were most akin to the sluggishness of his temperament—uncertainty and indefiniteness of thought, philosophic dreaminess laming every conviction, ambition touched with fatalism firing a morally indifferent soul.

Switzerland was the real foster-mother of the brighter and healthier side of his nature. Had he been practical and a man of rectitude, he could have extracted from his political and social experience of that country principles sufficiently clear and wise to prove themselves the palladium of his later reign. There he developed his aptitude for military science: he followed the courses of instruction given to the Swiss militia officers. Fairly competent in artillery, in engineering, in the exact sciences, in history, and in athletic exercises, he wrote and published at Zurich (1836) a *Manuel d'Artillerie.* He hastened with his elder brother Louis into Italy in 1830 to assist the province of Romagna in its revolt against pontifical rule, an expedition in which Louis perished of fever, and he was himself severely stricken, but was nursed out of danger by his tender mother. This expedition, though proving that he could act with energy in the discharge of Bonapartist responsibility, was a mere episode in that Swiss period of his life, extending from 1824 to 1836, in which he was exclusively a student and a writer. When at the death of the Duke of Reichstadt he became the head of that rootless growth, the Napoleonic dynasty, he sought as a pretender to lean less on any concrete historical claim to the throne of France than on the partiality of the French to a vainglorious rule, and on the intellectual interest with which he, as a man of letters, could invest the so-called Napoleonic ideas. For sixteen years he sued for the hand of France and the attention of the world, interrupting twice the method of literary courtship to make personal raids upon the kingdom of Louis-Philippe. He had indeed a

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fair chance. Outside of France, nationalities whose emancipation had been planned by Napoleon I., such as Poland, looked to him to effect their long-deferred liberty (1831). In France he was an outlaw, because a formidable rival to Legitimacy; in the struggle between the junior branch of the Bourbon dynasty and the forces at work since the Revolution, the Bonapartists had a permanent power of intervention and might enlist as their own partisans the masses of Frenchmen who were lukewarm politicians. Moreover, Napoleon I.'s utter failure as an international politician had in no wise shaken the organisation he had given to France; his home legislation had become part and parcel of the nation; French law, French public education, French military institutions, the joint restoration of state and church stood forth as his lasting work.

Almost a stranger to France in nurture of thought and tone of mind, an adventurer rather than a pretender, a philosopher rather than a man of action, taciturn, speculative, driven from within by a set motive rooted in a fixed idea, absorbed with German mysticism and Italian wiliness in a career so fateful to his mind that moral bridling could not avail at its turning-point, a philanthropist in some of his dreams, an idealist in some of his deeds, the heir of the French Cæsar drifted to his destiny, not without some vigour and brightness, a victim to the alleged mission of his race, to which he was enslaved as by hypnotic suggestion. He published in 1832–36 his *Rêveries politiques*, *Projet de Constitution*, and *Considérations politiques et Militaires sur la Suisse*. In 1836, speculating on the instability of Louis-Philippe's throne, the disaffection of some of the middle classes, the general favour of his semi-socialistic theories with the advanced parties, and the unspent prestige of Napoleon I., he put his chances to a premature test by appearing among the military at Strasburg, hoping to bribe them into his service by the prospect of their resuming the paramount position which soldiers could not but occupy in a Napoleonic state. The rash young man was easily overpowered and conveyed to America, without being brought to trial. Being under no pledge to stay in America, Louis Napoleon returned to Europe on hearing of his mother's illness. He found her dying; two months later he received her last sighs (3d October 1837). Although the affair of Strasburg had naturally enough caused many people to doubt the talent and the judgment of Louis Napoleon, still Louis-Philippe, who was politically an extremely timid monarch, dreaded some new conspiracy; the French government demanded of Switzerland the expulsion of the obnoxious prince, M. Molé actually enjoining the French ambassador to demand his passports, in case of a refusal. Switzerland had neither the right nor the wish to expel, and was on the point of going to war for the distinguished refugee (who was, in fact, a Swiss citizen) when he resolved to prevent a rupture by leaving his adopted country. He now proceeded to England, and settled in London. With certain members of the British aristocracy he came to live on a footing of considerable intimacy, and he was also an object of languid wonder and interest to the community generally, but he impressed nobody with a belief in his future and his genius; nay, Englishmen erred so far as to suppose that the 'silent man' was merely 'dull.' In 1838 he published in London his *Idées Napoléoniennes*, which, read in the light of subsequent events, are very significant. Europe generally regarded them as idle dreams; but in France the book went through numerous editions. In 1839 Louis Napoleon was in Scotland, and took part in the celebrated Eglinton tournament. Next year (1840) he made his second attempt on the throne of France at Boulogne. It was as grotesque a failure as the one at Strasburg. Captured on the shore, while endeavouring to make his escape to the vessel that had brought him from England, Louis Napoleon was now brought to trial, and condemned to perpetual imprisonment in the fortress of Ham. Here he continued his Bonapartist propaganda by writing *Aux Mânes de l'Empereur*, *Fragments Historiques*, *Analyse de la Question de la Suisse*, *Réponse à M. de Lamartine*, *Extinction du Paupérisme*, &c.; and actually took part in editing the *Dictionnaire de la Conversation*, a valuable French encyclopædia. After an imprisonment of more than five years, spent in patient meditation, he made his escape (25th May 1846), by the help of Dr Conneau, in the disguise of a workman, and gained the Belgian frontier, whence he returned to England.

The revolution of February (1848) was a victory of the working-men to whom some of his political theories were especially addressed; he hurried back to France as a virtual nominee of the *Fourth Estate*, or working-classes in town and country—an embarrassing position, from the obligations of which the smashing up of the Parisian socialists by the forces of General Cavaignac released the future emperor. Being elected deputy for Paris and three other departments, he took his seat in the Constituent Assembly, 13th June 1848. On the 15th he resigned his seat and left France. Recalled in the following September by a quintuple election, he once more appeared in the Assembly and commenced his candidature for the presidency. The direct election of the head of the state by the people, intended as a republican institution, proved itself to be a stepping-stone to Cæsarism, as Louis Napoleon's peculiar conception of a modern imperial democracy is called; in the constitutional history of the second empire such appeals to universal suffrage bear the name of *plébiscites*. Out of seven and a half million of votes 5,562,834 were recorded for Prince Louis Napoleon; General Cavaignac, his genuine republican competitor, obtaining only 1,469,166.

On the 20th December he took the oath of allegiance to the Republic. For a few days concord seemed established between the different political parties in the Assembly; but the beginning of the year 1849 witnessed the commencement of a series of struggles between the president and his friends on the one side and the majority of the Assembly on the other—the latter being justly penetrated with the conviction that Louis Napoleon was not devoted to the interests of the Republic, but to his own. He became practically a traitor to his republican oath when, in league with monarchical Austria and the king of Naples, he put down the republican movement in Rome. Then he committed the command of the army to hands devoted to him, he established his personal supporters in posts of honour and influence, he gained by frequent visits the favour of the provincial towns, and by acts of liberality and clemency kept that of the people. He paraded as a protector of popular rights and of national prosperity, laying to the door of the Assembly the deficiencies in his government. Resolved to transform his tenure of power by periodical election into a life-long one, he was hampered by the National Assembly; and, with the example of his uncle's *coup d'état* (18th Brumaire 1799) before him, he deliberately threw off the mask of a constitutional president, forswore his formal oath, and became a traitor to all society. From that moment a perpetual misunderstanding, badly cloaked by material prosperity and military glory, underlay Napoleon's relation to the French and to Europe generally. His methods of government belonged to no acknowledged régime.

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He whom Victor Hugo has satirically called Napoleon-le-Petit fatuously chose the anniversary of the battle of Austerlitz and of Napoleon I.'s coronation to rid himself by arms of the National Assembly, to make himself absolute ruler with the help of the military, and to muzzle all parliamentary opposition (2d December 1851). Imprisonment, banishment, deportation, the bloody repression of popular rebellion marked this black day's work, in which the president was assisted by Morny, Maupas, and St Arnauld. France, whether wearied of the incompetent Democrats, or (as Kinglake supposes) 'cowed' by the terrible audacity of the president, appeared to acquiesce in his act; for when the vote was taken upon it on the 20th and 21st of the same month, he was re-elected for ten years, with all the powers he demanded, by more than 7,000,000 suffrages. The imperial title was assumed exactly a year after the *coup d'état*, in accordance with another plebiscitary expression of the people's will.

An unlawful empire was now legally established. Men of astuteness and mediocrity took the helm of the state. The parliamentary trappings of the first empire were brought out. Resting on such artificial props as the army and police, Napoleon III. boasted that he was the upholder of law and order. Political parties were either demoralised or broken. He gagged the press, awed the *bourgeoisie*, and courted the clergy to win the peasantry. Liberals accepted him for fear of the Socialists; the Socialists applauded his plunder of the Orleans family; his duly-rewarded parasitic supporters, such as Jean Fialin, made Vicomte de Persigny, clung to him as to the fount of all honour and profit; foreign monarchies accepted him as a welcome ally in the struggle against liberalism. But unlike his uncle he did not seek matrimonial alliance with the old royal houses. He liked to profess himself the Cæsar of the people, and led to the altar Eugénie de Montijo, a Spanish countess of ordinary blue blood. He endeavoured to gain international acceptance for the just, but in his mouth sophistical, doctrine as to the right of peoples to choose their own masters, availing himself of it in the annexation of Savoy and Nice to France, in his Mexican intervention, and in his handling of the Italian question. At home he kept the people well in hand by an active economic policy. The price of bread was regulated, public works occupied and enriched the working-men in towns, while others were undertaken to protect and enhance in value the property of the peasantry. The complete remodelling of Paris under the direction of Baron Haussmann raised considerably the value of house-property, and by the opening of a network of thoroughfares suitable for the manœuvres of artillery and cavalry reduced to a minimum the risk arising from insurrectionary movements. The holding of international exhibitions and the signing of treaties of commerce with foreign states acted as a further inducement to internal peace; but the formation of unscrupulous financial, court, and clergy cliques was an ugly blot on this picture of a purely material prosperity.

To the blandishments of work and wealth at home Napoleon III. added the charm of a brilliant foreign policy. We need not dwell on the Crimean war, the campaign in Lombardy against Austria, to which Napoleon was somewhat paradoxically encouraged by the murderous attack of Orsini on his person, the expeditions to Mexico and to China. In all those undertakings Napoleon enjoyed the support if not always the actual co-operation of Great Britain. To Prussia his relations were of a very different kind, a mixture of jealousy and patronage which boded ill for France in the event of an actual conflict.

At the death of Morny in 1865 the soothing effect of Napoleon's measures and also his power to control the nation were well-nigh spent. Again the spirit of France stirred abroad. Napoleon's book, *La Vie de César*, which he wrote to extol his own methods of government under the guise of honouring Cæsar, met with loud protests. Forewarned, Napoleon reorganised his army, set himself up more proudly as an arbiter in Europe in order to flatter his subjects, and took a more conciliatory attitude to liberalism. His concessions at home were taken advantage of to set up a regular journalistic and parliamentary opposition. In 1869 the Liberal deputy Ollivier was granted a personal interview that he might explain to the emperor the wishes of the people, and Rouher, Napoleon's prime-minister, an advocate of absolutism, was dismissed from office. New men were called into power with Ollivier to liberalise the constitution. Some wrong-headed Bonapartists suggested another *coup d'état* against the Legislative Assembly, now leavened with opposition. Napoleon was firm enough to resist such nefarious counsels, and appears to have been fairly sincere in his latter-day liberalism. That it was not yet too late to stem the tide of discontent was shown by the result of another plebiscite (the fourth), by which Napoleon's new parliamentary scheme was sanctioned by 7½ million votes (8th May 1870). But burdened as he was by a new policy at home, by financial embarrassments and worries in his own family, in ignorance of the corruption that existed in his ministry of war, he sought in foreign affairs a diversion to his troubles, and thus brought himself all of a sudden to the edge of the abyss. For the Franco-German war, see FRANCE (Vol. IV. p. 782).

Napoleon III. surrendered himself a prisoner at Sedan in September. Till the conclusion of peace he was confined at Wilhelmshöhe. In March 1871 he joined the empress at Chiselhurst, Kent, and resided there till his death on 9th January 1873.—His son, Eugène Louis Jean Joseph, Prince Imperial of France, was born 16th March 1856. He was in the field with his father in 1870, but after the fall of Sedan escaped to England, where he entered the Woolwich Military Academy, and in 1875 completed with distinction a regular course of study. Volunteering to serve with the English artillery in the Zulu campaign of 1879, he was killed on 1st June, when reconnoitring, by a party of Zulus in ambush.

See Blanchard Jerrold's apologetic *Life of Napoleon III.* (3 vols. 1874–77); Delord, *Histoire du Second Empire* (6 vols. Paris, 1869–75); Simson, *Die Berichungen Napoleons III. zu Preussen und Deutschland* (1882); C. E. de Maupas, *Story of the Coup d'État* (Eng. trans. 2 vols. 1884); Hugo's *Hist. d'un Crime* (1877); E. Barlees, *Life of the Prince Imperial* (1880); and the *Memoirs* of the Duke of Coburg, vols. iii. and iv. (1890).

Napoleon, PRINCE. See BONAPARTE.

Napoleon. See LOUIS D'OR.

Napoleon, a round game at cards. Five cards are dealt to each player by one at a time, as at whist. Each player in rotation to the dealer's left looks at his hand and declares the number of tricks he will stand for, or whether he will pass. If all pass, the first player must stand for one trick. When a declaration is made subsequent players must stand for more tricks or pass. If *Nap* (all five tricks) is declared, no further declaration is made. The stand-hand leads; the card he first leads makes the trump suit. The other players follow suit in rotation, as at whist, the winner of the trick leading to the next. The cards rank as at whist. A player not able to follow suit may play any card. No one is obliged to head the trick. If the stand-hand wins the number of tricks he stood for, he receives so much for each trick from each of

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the other players. If he fails he similarly has to pay all round. If Nap is declared and won, the stand-hand receives double all round; if lost, he only pays single. Sometimes this rule applies to four tricks, when Nap receives triple and only pays single. There is no misdeal; errors in dealing require a fresh deal. A player who exposes a card before all have declared, or declares out of turn, cannot stand on that hand. A player who exposes or detaches a card after the play has begun, or who plays out of turn, is fined the value of three tricks to the stand-hand, besides what he loses if the stand-hand wins. If the stand-hand loses, the player fined receives nothing. The stand-hand is liable to no penalty for exposing or detaching a card, nor for playing out of turn. If the stand-hand revokes he loses what he stood for. If any other player revokes, and the stand-hand wins, the revoker has to pay for all the players; if the stand-hand loses he has to pay to all but the revoker, who receives nothing. Cards played after the correction of a revoke are replayed. See H. G. Playfair's *Game of Napoleon* (1884).

Napoleona (also called *Belvisia*), a tropical African genus of myrtaceous plants, of which the one known species *N. imperialis* has showy red, white, or blue flowers, and a fruit resembling a pomegranate.

Narbonne, a town in the French department of Aude, on the La Robine branch of the Canal du Midi, 8 miles from the Mediterranean and 93 by rail ESE. of Toulouse. The removal since 1865 of the fortifications has been an improvement, but the place remains dirty and unattractive, with only three noteworthy buildings. These are the Romanesque church of St Paul (1229); the quondam cathedral of St Just (1272–1332), only the fine Gothic choir of which, 131 feet high, has been completed; and the former archbishop's palace, now the hôtel-de-ville, in one of whose three old towers Louis XIII. in 1642 signed the order to arrest Cinq Mars, and in which are a good museum, a library, and a picture-gallery. The white heather-honey of Narbonne maintains its ancient celebrity; the wine is chiefly used for blending purposes. Pop. (1872) 14,150; (1886) 26,391. Narbonne is the *Narbo Martius* of the Romans, their earliest colony (118 B.C.) beyond the Alps; and, situated on the high-road to Spain and the basin of the Garonne, was a place of great commercial importance. Under Tiberius it flourished greatly, its schools for a long time rivalling those of Rome. About 309 A.D. it became the capital of *Gallia Narbonensis*, and had its capitol, forum, theatre, aqueducts, triumphal arches, &c. In 412 it was taken by the Visigoths, in 719 by the Saracens, from whom it was recovered by Pepin in 759, to fall just a century later to the arms of the Northmen. During the 11th and 12th centuries it was a prosperous manufacturing city, but subsequently it decayed. Varro and Montfaucon were natives.

Narcissus, according to a Greek fable, was the son of the river god Cephissus and of the nymph Liriope or Liriœssa of Thespiæ, in Bœotia. He was a youth of extraordinary beauty, of which he was excessively vain; and for this he was punished by Nemesis by being made to fall in love with himself on seeing the reflection of his own face in a fountain. He died of this love-sickness; and on the place where he died sprung up the flower which bears his name. The story of Narcissus, narrated by Ovid, is of comparatively late origin.

Narcissus, a genus of plants of the natural order Amaryllideæ, having a perianth of six equal petal-like segments, and a bell-shaped corona of various magnitude. The species are natives of the south of Europe, the north of Africa, and the temperate parts of Asia. The Common Daffodil is the only one which can be regarded as truly a native of Britain. Many are cultivated in gardens for the sake of their beautiful and often fragrant flowers, which in general appear early in the season. Some of them are known by the names of Daffodil (q.v.) and Jonquil (q.v.). The name narcissus is popularly restricted to those which have flat (not rush-like) leaves, and a short (not bell-shaped) corona. Of these one of the best known is the Poet's Narcissus (*N. Poeticus*), with generally one-flowered scape, the flower white and fragrant, the corona with a deeply-coloured border; others with one or two flowers on the scape are in common cultivation. The Polyanthus Narcissus (*N. Tazetta*) has a number of flowers on the scape. It grows wild in stony places near the Mediterranean and eastwards to China. Many varieties of it are in cultivation. It is grown not only in gardens and greenhouses, but in water-glasses, like the hyacinth. It is very common in gardens in India, where it is highly esteemed as a flower. The narcissi in general are propagated either by seed or by offset bulbs. They succeed best in a rich light soil.

Narcissus Poeticus.

Narcotics (Gr. *narkē*, 'stupor') are remedies which produce stupor if the dose be increased beyond a certain point. Opium is the most important member of the group, and the type from which most descriptions of the action of this class of medicines have been drawn; but it includes substances of very various properties. Some, as alcohol, produce intoxication in lesser doses; some, as belladonna, delirium; most have a primary stimulating effect: in fact, almost every one presents some peculiarity in the way in which it affects the system, and no satisfactory general description of their minor effects is possible. Their power of inducing sleep has procured for them the names of Hypnotics and Soporifics; while many of them are termed Anodynes, from their possessing the property of alleviating pain. Next to opium, Henbane, Indian Hemp, and Chloral may be regarded as the most important narcotics. Numerous artificially-produced organic compounds have been introduced during the last few years, some of which (e.g. paraldehyde, sulphonal as hypnotics; antipyrin, exalgin—an aniline derivative—as anodynes) will probably take a permanent place among useful remedies.

Narcotics are usually administered either with the view of inducing sleep or of alleviating pain or spasm. As, however, their action is much modified by a variety of circumstances—such as age, idiosyncrasy, and prolonged use—they should be administered with extreme caution, and, as a general rule, only under competent advice. The various quack medicines for children which are known as *Carminatives*, *Soothing Syrups*, &c. almost always contain some form of opium, and are a fertile cause of the great mortality that occurs in early life, especially among the poorer classes. All the narcotics when taken in excess are poisonous (see POISONS).

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Narcotine ($C_{22}H_{23}NO_7$) is one of the organic bases or alkaloids occurring in opium, in which it usually exists in the proportion of 6 or 8 per cent. It is nearly insoluble in water, but dissolves sparingly in alcohol, readily in chloroform and ether. Narcotine possesses very slight alkaline properties; its salts do not readily crystallise, and are even more bitter than those of morphia, although the substance itself is almost tasteless. When first discovered (in 1803) it was supposed to be the stimulant principle of opium; but in reality it possesses very little activity. Its sulphate has been used in India as a substitute for quinine. Narcotine yields a great variety of compounds by decomposition, perhaps the most interesting being vanillin, the flavouring principle of vanilla.

Nard. See SPIKENARD.

Nardoo (*Marsilea macropus*), a plant of the order Marsileæ (see RHIZOCARPS), the only plant of that order which is used in any way by man. It is found in Australia, and affords important supplies of food to the natives of some regions; it has also been of great use to some exploring parties. It grows in places occasionally covered with water; vegetating whilst moisture abounds, and then exhibiting abundance of green clover-like foliage, the leaves consisting of four leaflets at the top of a stalk some inches in length. When the water dries up, the remains of the plants are often covered with dried mud. It is then that the spore-cases are gathered for food. They are oval, flattened, about an eighth of an inch in length, hard and horny, and requiring considerable force to pound them when dry, but becoming soft and mucilaginous when moistened. The spore-cases, pounded with their contents, are made into cakes like flour.

Nardoo (*Marsilea macropus*).

Nariad, a town in the presidency of Bombay, 29 miles SE. of Ahmadabad by rail. It does a great trade in tobacco and ghee, and has a government experimental farm. Pop. (1881) 28,304.

Narragansett Bay. See RHODE ISLAND.

Narses, a statesman and general, and almost the last stay of the old Roman empire in Italy, was born in Persian Armenia about 475 A.D., and being a eunuch was probably sold as a slave in childhood. From some menial office in the imperial household at Constantinople he rose to the post of keeper of the privy-purse to the Emperor Justinian. In 538 he was sent to Italy in command of a body of troops, professedly to act in concert with Belisarius (q.v.), but in reality, it is believed, with a secret commission to observe and to control that general. After some successes Narses, having disputes with Belisarius, assumed an independent authority; but his separate command was unfortunate, and he was recalled to Constantinople in 539. After some years, however, Belisarius was recalled, and Narses was appointed to the chief command in Italy. His conduct of that expedition extorted the admiration even of his enemies. Not having the command of a sufficient number of transports, he marched his army along the whole circuit of the shore of the Adriatic, and, while the enemy's fleet were still in possession of the sea, was enabled to encounter them at Taginæ (in the Apennines), where, after a desperate engagement, the Ostrogoths were totally defeated, and their king, Totila, slain. Narses took possession of Rome, and, after a series of successes both in Southern and Northern Italy, completely extinguished the Gothic power in that peninsula. Justinian appointed Narses prefect of Italy in 554. He fixed his court at Ravenna, and continued till the death of Justinian to administer the affairs of Italy with vigour and ability. But he was charged with avarice; and his exactions pressed so heavily on the exhausted resources of the population that on the death of Justinian the Romans complained to Justin of the exactions of Narses, and that emperor deprived him in 567 of his office. He is accused of thereafter intriguing with Alboin, king of the Lombards, for a new invasion of Italy; and he died at Rome about 573. See GOTHS, JUSTINIAN; and Hodgkin's *Italy and her Invaders.*

Narthex. See BASILICA.

Narva, a Russian town 101 miles WSW. of St Petersburg, on the Narova, 10 miles from its mouth in the Gulf of Finland. The navigation of the Narova is impeded by a waterfall near Narva, 14 feet high, which is taken advantage of for driving cotton-mills, sawmills, &c. Pop. 8600. Charles XII. (q.v.) won a great victory here in 1700.

Narvaez, RAMON MARIA, general and statesman, was born at Loja, in Andalusia, 5th August 1800, and when very young served in the war of liberation against the French. In 1822, when a reactionary party took up arms to destroy the work of the revolution, Narvaez ranged himself on the side of the liberals. The invasion of Spain by a French army in 1823 forced him to retire from active life until the death of Ferdinand VII. in 1832. In 1834 he maintained a hot struggle against the Carlists of the Basque Provinces, and in 1836 completely routed the Carlist leader, Gomez, near Arcos. He now became immensely popular, and was regarded as the rival of Espartero. In 1838 he cleared the district of La Mancha of brigands, and was appointed in 1840 captain-general of Old Castile. He took part in the insurrection against Espartero that broke out at Seville in 1840, but, that having failed, he was compelled to flee to France, where he was shortly after joined by Queen Christina (see MARIA CHRISTINA), and commenced those plots against the government of Espartero which in 1843 effected its overthrow. In 1844 he was appointed president of council, and created Duke of Valencia. His ministry was thoroughly reactionary, but was overthrown in 1846. After a brief exile as special ambassador at the French court, he returned to power from 1847 to 1851, in 1856–57, and again in 1864 and in 1866; and, despite the efforts of O'Donnell and Prim, he retained power till his death, 23d April 1868.

Narwhal (*Monodon*), a genus of Cetacea, belonging to the Odontocetes or toothed whales (see WHALE); it is characterised by the presence in the adult male of a long tusk, and by the early disappearance of the other teeth, and by other structural points of less importance. The tusks represent canine teeth, and there are sometimes a pair of them present, lying side by side in the upper jaw; there is such a specimen in the Cambridge Museum. When there is only one tusk, it is the left; rarely the female has a tusk, so rarely, however, that there are only three instances

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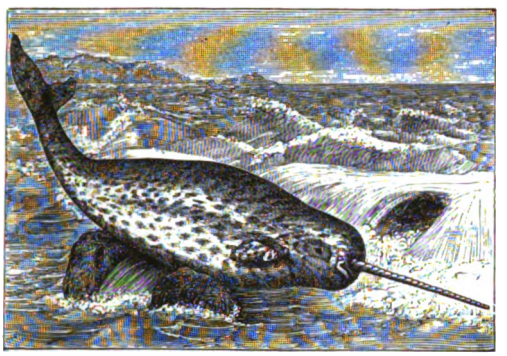
on record. There is only one species known, *M. monoceros*, which inhabits the northern seas, and has been on one or two occasions stranded on British shores; it was first recorded in Britain by Vulpius from the Isle of May in 1648; another was observed in 1800 in the Wash in Lincolnshire. It is common off the shores of Greenland, and is hunted for its oil as well as ivory; as the creature



Narwhal (*Monodon monoceros*).

is gregarious, sometimes travelling in herds 'of many thousands,' it is captured in considerable abundance. In early times the tusk of the narwhal was valued in medicine, and to this day is so used by the Chinese. The ivory is very fine, and in the castle of Rosenborg at Copenhagen is a throne of the kings of Denmark made of this substance. The female narwhal is more spotted than the male, and the young darker. The fact that the female has not the tusk seems to negative the view that it is of use in spearing fish; it is no doubt used by the males for fighting—for examples are seldom unbroken. Fabricius thought that their use was to break and keep open holes in the ice during the winter, and observers have seen such breathing-holes crowded with heads of narwhal and other whales.

Naseby, a Northamptonshire parish, 7 miles SW. of Market-Harborough. Here, on 14th June 1645, 7500 royalists under Charles I. and Prince Rupert were totally defeated by 14,000 parliamentarians under Fairfax and Cromwell, the king losing cannon, baggage, and 5000 prisoners. A 'blockhead obelisk,' which does *not* mark the battlefield, was erected in 1823 on the Naseby ridge (648 feet). See Gardiner's *History of the Great Civil War* (vol ii. 1889).

Nash, JOHN, architect, born in London in 1752, after the usual course of training for his profession entered into some building speculations which enabled him to buy a small property in Carmarthen. Here in fresh speculations he lost much money; therefore, in 1792, he returned to London and architecture, in which he speedily rose to eminence. On the strength of a patent (1797) for improvements in the construction of the arches and piers of bridges, he claimed a great part of the credit of introducing the use of metal girders. A large part of his time was occupied in designing and constructing mansion-houses for the nobility and gentry in England and Ireland, but he is chiefly celebrated in connection with the great street improvements in London. From February 1815, when he was appointed 'architect, valuer, and agent to the Board of Woods and Forests,' down till near the end of his professional career, he was busily engaged in the planning of routes, grouping of buildings, and fixing of sites. Regent Street, Haymarket Theatre, and the terraces in Regent's Park are specimens of his designs. The Pavilion at Brighton, about which he published a book, was another of his works. He retired from his profession in 1834, and died May 13, 1835. Nash, notwithstanding his many defects, possessed great power of effective grouping, as is well shown in his works. In the architecture of mansion-houses, the designing of 'interiors' was his *forte*.

Nash, RICHARD, better known as 'Beau Nash,' was born the son of an impoverished Welsh gentleman at Swansea, October 18, 1674. He was educated at Carmarthen and Jesus College, Oxford, held for some time a commission in the army, and next entered at the Middle Temple, but found greater attractions in the dissipations of society than the pursuits of law. He conducted the pageant at the entertainment of William III. by the Inns of Court, and is said to have declined the honour of knighthood without a pension. He made a shifty living by gambling, but in 1704 he found his true function as master of the ceremonies at Bath, where he conducted the public balls with a splendour and decency never before witnessed. In this way he came to acquire an imperial influence in the fashionable society of the place. It appears that he was also distinguished by his sentimental benevolence. He played hard and successfully; yet if he heard an individual sighing behind his chair: 'Good Heavens! how happy would that money make me,' Nash would thrust his own winnings into his hands, with theatrical generosity, and exclaim: 'Go, and be happy.' His own equipage at this period of his career was sumptuous. He used, we are told, to travel to Tunbridge in a post-chariot and six greys, with outriders, footmen, French-horns, and every other appendage of expensive parade. He is praised for the great care which he took of the morals of the young ladies who attended the Bath balls, always putting them on their guard against needy adventurers like himself. In his old age Beau Nash sank into poverty, and often felt the want of that charity which he himself had never withheld. He died at Bath, February 3, 1761, and received a public funeral. A Life by Goldsmith was published anonymously in 1762.

Nash, THOMAS, a busy writer in the last decade of Elizabeth's reign, was born at Lowestoft in 1567, studied almost seven years at St John's College, Cambridge, travelled abroad, visiting Italy and Germany, and thereafter plunged recklessly into the life of letters in London, and forced a shifty living from fate until the close. He kept ever a high heart amid manifold troubles, and, satirist as he was, his inexhaustible gaiety and goodness made him the darling of his friends—the 'sweet boy' and 'sweet Tom' of Greene and Francis Meres. He was dead by 1601, as prematurely as Marlowe, Peele, and Greene. Nash had a genuine relish for good literature; he praises warmly Rabelais, Aretino, Spenser, Sidney, and Marlowe. He had also a great faculty for vituperation, and the times were favourable for its exercise. His first writing was his vigorous preface to Greene's *Menaphon* (1589), and this was quickly followed by the *Anatomie of Absurditie* (1589), a satirical discussion on social manners; a series of impetuous tractates flung into the Marprelate controversy; *Pierce Penilesse, his Supplication to the Divell* (1592), full of keen observation and satire, and rich in autobiographical interest; *Strange Newes* (1593); and *Have with you to Saffron Walden* (1596), containing a vehement onslaught on Gabriel Harvey; *The Terrors of the Night, or a Discourse of Apparitions* (1594); *Christ's Tears over Jerusalem* (1593), a long, edifying discourse; *The Unfortunate Traveller, or the Life of Jack Wilton*

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(1594), the best specimen of the picaresque tale in our literature before Defoe; *The Isle of Dogs* (1597), which was at once suppressed, and is now lost, and for which the author was sent to prison; and *Lenten Stuffe* (1599), 'in praise of the red herring,' really a humorous description of Yarmouth. The tragedy of *Dido* was written in collaboration with Marlowe; *Summer's Last Will and Testament*, by Nash alone.

See the Memorial Introduction in Dr Grosart's *Complete Works of Thomas Nashe* (6 vols. 4to, Lond. 1883–84); also chap. vi. of Jusserand's work, *The English Novel in the Time of Shakespeare* (Eng. trans. by Eliz. Lee, 1890).

Nashua, a manufacturing city of New Hampshire, is 40 miles by rail NW. of Boston, at the junction of the Merrimac and Nashua rivers. The falls of the latter, rendered available by a canal 3 miles long, supply motive-power to many manufacturing establishments, including very extensive cotton-factories and ironworks, paper and carpet mills, &c. Pop. (1880) 13,397; (1890) 19,311.

Nashville, the capital of Tennessee, is on the navigable Cumberland River, 200 miles above the Ohio, and 185 miles by rail SSW. of Louisville. The city, which is one of the principal railway centres in the southern states, is built mainly on the left bank of the river, which is crossed by a suspension bridge and a railway drawbridge to the suburb of Edgefield. Nashville is a handsome, well-built town, with an imposing state capitol of limestone ($1,500,000), a penitentiary (400 cells), and a large lunatic asylum. As an educational centre the city is of considerable importance. The public-school system is excellent; and here are the Nashville University (1806), Vanderbilt University (Methodist Episcopal South, 1875), Central Tennessee College (for coloured Methodists, 1866), Fisk University (Congregationalist, 1867, with few but coloured students), Roger Williams University (Baptist, also for coloured students), the state normal college, &c. Most of these institutions are open to both sexes. The city has a large wholesale trade, the staples being cotton and tobacco; while its manufactures, which are rapidly extending, include cotton, flour, oil, paper, furniture, timber, leather, iron, and spirits. Founded in 1780, Nashville became the legal capital in 1843. In December 1864 the Confederates under Hood were completely defeated here by General Thomas. Pop. (1870) 25,865; (1880) 43,350; (1890) 76,309.

Nasik, a town of Bombay, on the Godavari, 31 miles from its source, with a railway station (4 miles distant), 100 miles NE. of Bombay. It ranks as one of the most sacred of Hindu places of pilgrimage, the banks and even the bed of the river being crowded with temples and shrines. Formerly it was a Mahratta capital; now it manufactures paper, cotton, and excellent brass and copper work. Pop. (1881) 27,070, including 2967 at the cantonment of Deolali.—The *district* of Nasik has an area of 5940 sq. m., and a pop. (1881) 781,206. See MAGIC SQUARES.

Nasmyth, JAMES, inventor of the steam-hammer, was the son of Alexander Nasmyth (1758–1840), portrait and landscape painter, best known by his portrait of Burns. He was born in Edinburgh, August 19, 1808. From boyhood he evinced a turn for mechanics, and in his father's house became accustomed to use a lathe. At seventeen he constructed a small working steam-engine for grinding his father's colours, and made besides five models of a condensing steam-engine, and later a small road locomotive. Employed in 1829 by Maudsley, he started in business at Manchester in 1834, gained a good connection, and established at Patricroft what afterwards became known as the Bridgewater Foundry. The invention of the Steam-hammer (q.v.) was conceived in 1839, the occasion being the necessity for forging an enormous wrought-iron paddle shaft. But it did not take shape till 1842, when he found the steam-hammer as he had planned it at work at Creuzot in France. It had been adapted from his own scheme-book. Nasmyth patented his invention on his return to England, and it was adopted by the Admiralty in 1843. Business increased, and by 1856 he was able to retire with a handsome fortune, and settled at Penshurst, Kent. Amongst his other inventions was a steam pile-driver. He published *Remarks on Tools and Machinery* (1858), and a volume on the *Moon* (1874). He died in London, May 7, 1890. See Life by Smiles (1883).

Naso. See OVID.

Nassau, formerly a German duchy, now Wiesbaden, a district of the Prussian province of Hesse-Nassau (q.v.). The soil is fertile and produces some of the most esteemed Rhenish wines. The chief towns are Wiesbaden (q.v.), the capital of the district; Schwalbach, Schlangenbad, Fachingen, Selters, and Geilnau.—The family of Nassau, the elder branch of which reigned till 1866, dates from the 10th century. The younger branch inherited in 1544 the principality of Orange (q.v.), and as the princes of Orange took an important place in European history (see HOLLAND). The reigning Duke of Nassau sided against Prussia in 1866, and his duchy was incorporated with Prussia (see PRUSSIA, GERMANY); and on the extinction of the male line of the Orange branch by the death of William III. of Holland, in 1890, the Duke of Nassau became Grand-duke of Luxemburg.

Nassau, the capital of New Providence, is the centre of the trade and seat of government of the Bahamas (q.v.) and a bishop's see. Pop. 5000.

Nasturtium, the botanical name properly of the Water Cress (see CRESS), but also the popular designation of the Indian Cress (*Tropæolum majus*). The genus Tropæolum is the type of the small natural order Tropæolaceæ, and comprises some beautiful garden climbers, such as the widely cultivated Canary Creeper (*T. aduncum*), a native of Peru, and the more recently introduced *T. speciosum*, a native of Chili, which has established itself in many districts in the north of Scotland and in Wales, and garlands the walls and roofs of cottages in summer and autumn with its festoons of vivid green leaves and brilliant crimson flowers. The Indian Cress is also a native of Peru; the whole plant is characterised by a warm pungent taste and tonic stimulant, and antiscorbutic properties are ascribed to it. The flowers are employed as an ingredient in salads and for garnishing the same. The seeds when green are pickled in salt and vinegar and used as a substitute for capers. As an ornamental garden climber or creeper, the Indian Cress has been long known and admired by cottagers and others.

Natal, a British colony on the south-east coast of Africa, was discovered by Vasco da Gama on the Christmas-day (hence its name) of 1497. In the 18th century intermittent trading was carried on between the Cape Colony and Natal, which in 1800 was peopled by ninety-four distinct tribes of natives. From 1805 to 1828 the despotic Zulu chief Tyaka (Chaka) enforced his own rule and that of his own immediate tribe or family clan, the Amazulu, over the congeries of tribes reaching from the Limpopo on the north to the Kei River in the south. Tyaka was killed in 1828 by a political faction who placed his younger brother Dingaan on the throne. Predatory Boers who had left the Cape Colony to escape British rule divided into parties and settled in the territories now known as Natal and the Transvaal; and conflicts

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between Boers and natives were very frequent. In 1838 an embassy of Boers were massacred by Dingaan, and a force of Boers proceeded to Zululand to avenge their friends. The country was at this time divided into two factions, one supporting Dingaan, and the other his younger brother Umpande (Panda). The Boers entered into a secret treaty with the latter, and a combined attack was made on Dingaan, who fled and was killed. Panda succeeded him as king, and the Boers were recognised as lords of the soil of Natal. In December 1838 Sir George Napier, the Cape governor, had sent a detachment of Highland troops to take possession of the inland territory and Port Natal; but owing to the Cape Kaffir disturbances the Highlanders were withdrawn, and the Boers at once hoisted the flag of 'the Republic of Natalia.' Two British ships of war were sent from the Cape to force a landing at Durban. After a short struggle there the Boers gave up the port, and fell back on Pietermaritzburg, the capital, the name of which is a compound of the Christian name of Pieter Retief and the surname of Gert Maritz, two leaders of the Boers. Civil negotiations were then entered on by Mr Cloete, and many of the Boers accepted British rule and settled down in Natal, forming there, as a portion of them and their descendants still do, an important and loyal section of the Queen's subjects in that colony. Those of the malcontents who crossed the Dragensberg and struck north soon found themselves fighting against Umzilikatze (father of Lobengula of Matabeleland) in the territory now known as the Transvaal. In 1843 Natal was officially declared to be a part of the British dominions, and the colony was formally annexed to the Cape of Good Hope on the 31st of May 1844. At that time the natives numbered about 150,000, although in the previous century their total was nearly a million. But intertribal fights and the struggles for supremacy of Tyaka scattered the clans of Natal far and wide. Subsequent to the annexation by the crown and its attendant peace the aborigines of Natal gradually returned from distant places, and their numbers are now nearly half a million. In 1855 there was a great flood in the colony and Zululand, and in the following year a very sanguinary fight for the Zulu succession took place on the Natal northern border, between two sons of Umpande—viz. Cetewayo and Umbulaze. After a bloody battle on the Tugela River the forces of the former won the day and Umbulaze's beaten men took refuge in Natal. On the 15th of July 1856 Natal was declared to be a separate British colony, and it was then given a limited form of representative institutions. During the decade ending with 1860 considerable immigration from Great Britain took place, and the immigrants of that time and their descendants occupy the most of the land of the colony to-day.

In 1873 friction arose between Langalibalele, one of the chiefs on the north-west boundary, and the next magistrate. Some of the chief's young men disobeyed the mandate of the magistrate to give up their guns. Orders were issued to apprehend the chief and certain of his followers. They retreated before the crown forces, but some of the Natal volunteers and mounted police cut them off in one of the mountain-passes; bloodshed ensued, and three well-known young colonists were killed. Langalibalele escaped to Basutoland, but was captured and brought back, tried very summarily in Maritzburg, and banished to the Cape Colony. Rigorous measures were adopted by the governor against Langalibalele's tribe and a neighbouring tribe. The home government, however, interfered and ended the injustice which had been done to the natives by the colonial authorities while under a feeling of panic. Langalibalele remained in the Cape Colony till 1885, when he was allowed to return to Natal as a prisoner on parole; he died near Maritzburg in 1889.

In 1875 there being in the colony much dissatisfaction with the methods of Downing Street rule, Sir Garnet Wolseley was sent out to settle matters. He promulgated a new constitution providing for an extension of the representative system with the check of certain eminent colonists, selected by the crown, having seats in the Legislative Council as nominee members. Sir Garnet Wolseley was succeeded by Sir Henry Bulwer. During the governorship of the latter a feeling of disquiet was shown in some quarters at the strength of the colony's neighbours, the Zulus under Cetewayo. Sir Bartle Frere, Her Majesty's High Commissioner for South Africa, visited the colony and came to the conclusion that in the interests of the British colonists in South Africa it was necessary to break the power of the Zulus. Despite the protests of the Natal government and Sir Henry Bulwer, the governor, an ultimatum which in itself was calculated to precipitate hostilities was served on the Zulu king, and war ensued (see ZULUS). In this war Natal suffered severely in the lives of its young colonists, in its treasure, and in the paralysis of its trade. For several years the colony was a camping-ground for British troops, for in 1881 the Transvaal Boers invaded Natal to anticipate the advance of English soldiers being sent to support those beleaguered in the Transvaal garrisons; and the fights of Schuin's Hoogte, Ingogo, Lang's Nek, and Amajuba (see MAJUBA) were all fought on British soil.

Natal is situated between 29° 10′ and 31° 10′ S. lat., and covers an area of 18,750 sq. m.—more than a third of that of England. Durban lies 800 miles ENE. of the Cape of Good Hope, and the colony has a seaboard on the Indian Ocean of 180 miles. It is bounded on the N. by the Tugela and Buffalo rivers, which separate it from the Zulu Reserve and the Transvaal; on the NW., W., and SW. by the Kwashlamba or Dragensberg Mountains, and on the S. by the Umtamvuna River, separating it from Pondoland. Towards the coast the Dragensberg Mountains present a scarped and almost inaccessible face; they gradually die away, however, into the immense rolling plains of the interior. Many offshoots from these mountains traverse the colony, dividing it into a series of steps or plateaus, rising from the coast region to the foot of the mountains, and forming so many zones of natural productions.

The coast region, extending for 30 miles inland, is highly fertile, the climate being subtropical and healthy. In 1856 the cultivation of the sugar-cane was introduced on the coast, and as an industry it has thriven more or less ever since. Besides supplying all South Africa with the staple, the value of the sugar exported by the colony to England in 1888 was £71,912. The culture of the cane requiring that continuous and arduous labour which the natives did not supply, the Legislative Council had to take steps to introduce immigrants from British India. This immigration began in 1863, and in 1891 there were 35,000 coolies in the colony with their attendant traders who followed them from India. The Assam tea-plant was introduced in 1877, and steady progress has been made with the industry, the annual yield being about 150,000 lb.; this is consumed locally, and as yet the colony still imports tea largely. Coffee and tobacco have been reared, as have also indigo, arrowroot, and ginger. All tropical fruits thrive well. The midland terrace is more fit for the cereals and usual European crops; while on the higher plateaus along

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the foot of the mountains are immense tracts of the finest pasturage for cattle and sheep.

The climate is very healthy; the thermometer ranges between 90° and 38° F., but the heat even in summer is seldom oppressive. The mean annual temperature at Pietermaritzburg, the capital, is 64·71°. The winter begins in April and ends in September. In the summer season the thunderstorms are very frequent and severe in the uplands. The annual rainfall over the whole colony averages nearly 40 inches, the greatest fall being in summer.

The colony has only one harbour worthy of the name, but that is the best on the south-east coast. It is called Durban (q.v.) or Port Natal. The harbour is of great consequence not only to the colony, but to the empire, as it must one day be an important coaling station. The principal rivers are the Tugela, Buffalo, Umkomanzi, Umgeni, Umzimkulu, and Mooi. Like the majority of African rivers, they are of little use for purposes of inland navigation; but their streams are permanent and often available for irrigating purposes.

Coal is destined to play a prominent part in the future of Natal, the area of the coal-measures being estimated at 1400 sq. m. The coal is serviceable for all ordinary purposes, the government railways being worked with it. Copper has been found, and much is hoped from the iron near the coal. The colony is also believed to be rich in other minerals, such as asbestos, mica, and plumbago. Gold has been found in the south and north. Great forests of fine timber abound in the mountain-passes, while many tracts along the coast are well wooded. The chief towns are Pietermaritzburg (15,767), 54 miles inland, the seat of government and the chief military station; Durban (18,433); Verulam and Pine Town near the coast, Harding in the south, and Richmond, Weenen, Colenso, Greytown, Ladysmith, and Newcastle, up country.

The government of Natal is now administered by a governor, assisted by an executive council of seven, of whom five are official and two nominee members, and a Legislative Council consisting of twenty-three members elected by the constituencies. Parliament exists for five years. A narrow majority in the council passed in 1891 a bill providing responsible government, but the measure has yet to receive the sanction of the imperial authorities; and an important section of the colonists has strenuously opposed the agitation for change. The home government offered the colonists responsible government in 1883 with certain guarantees for native protection, but they refused the offer. About 1865 Natal was plunged into ecclesiastical warfare. Bishop Colenso (q.v.), the then head of the diocese, was declared heterodox by a party in the church, and unsuccessful efforts were made in South Africa and England to depose him. A rival church was, however, established on the voluntary system, entitled the Church of England in South Africa, whose head bears the title of Bishop of Maritzburg. The Presbyterian (Scottish and Dutch), Roman Catholic, and other churches are well represented; many stations of the Wesleyan, American, Norwegian, and Berlin Missions exist; and the order of the Trappists do good work near Pine Town. Schools are multiplying fast.

The chief passes through the Dragensberg are Van Reenen's, Oliver's Hoek, Bezuidenhout, De Beer's, and Lang's Nek. Most of the rivers have been substantially bridged, and a very energetic policy of public works is being pursued by the government. A railway runs through the colony, and will shortly connect the coast and the Free State and Transvaal. The government lines, 300 miles long, are also laid north and south of Durban for short distances along the coast. Durban and Maritzburg were connected by the railway in 1880.

Natal's chief exports are wool, sugar, ivory, and hides. The wool exported to Great Britain in 1889 was valued at £752,182, and weighed 29,489,716 lb. The clips of three seasons from Natal and Overberg were as follows: in 1886–87, 63,300 bales; in 1887–88, 76,000 bales; and in 1888–89, 78,500 bales. The total value of exports in 1889 was £1,656,318. These comprise, in addition to those named, cotton, coffee, arrowroot, feathers, molasses, rum, horns, maize, and skins. In 1856 the exports amounted to £56,562; in that year the value of the imports was £102,512. In 1889 the imports reached £4,527,015. The revenue in 1857 was £43,780, and the expenditure in the same year was £36,438. In 1889 the revenue (raised mainly from railway receipts and customs) was £1,336,155, and expenditure £1,295,568. The increased prosperity of Natal is largely attributable to new gold discoveries in the Transvaal. The bulk of the Natal trade is with the mother-country, although a considerable business is done with Australia, India, and North and South America. Certain kinds of grape thrive well in Natal, and the wine industry is now engaging the attention of the colonists. In 1876 the population numbered 326,957 (20,490 whites); in 1891, 543,913, divided as follows: 46,788 whites, 41,142 Indian coolies, and 455,983 natives. The natives possess horses, cattle, sheep, &c. They are a fine race physically, gifted with high intelligence, of frank and courteous bearing, and very easy to govern. Upwards of 2,000,000 acres of land have been set apart as locations for the natives, and over 6,000,000 acres have been acquired by grant or purchase by Europeans, the balance of land being retained for allotment to new settlers.

The common law in the colony is that prevailing in Holland during the 16th and 17th centuries, modified by statute law in the same way practically as obtains in all the South African states. The chief difference between English and Roman Dutch law rests in the laws of marriage and inheritance, but the difference is now by statute largely optional. The coolies are subject to the laws regulating Europeans, as well as to special laws controlling Indian immigration. The natives are with few civilised and exempted exceptions subject in civil matters to native law, which is quite different from colonial law. The Supreme Court consists of the chief-justice and two puisne justices; and there are stipendiary magistrates and administrators of native law in all important centres.

Eland (q.v.) and hartebeest (see ANTELOPE) are the only big game left, and these have been made royal game. There are stringent laws for the protection of deer and game-birds. Alligators are met with in a few of the central and northern rivers. Snakes, both colubrine and viperine, are in plentiful distribution throughout the colony. Many of the snakes are innocuous, and fatal bites from the poisonous species are rare. The python, which attains a large size, is to be found in the seacoast forests, and in the reeds by the river-sides. The hippopotamus is still to be met with at the mouths of some of the northern rivers.

See *The Annals of Natal* (1889), by John Bird; *Natal Almanac*; Annual *Blue Book*; *Our Colony of Natal*, by Walter Peace; *The Natal Sugar Industry*, by W. Y. Campbell; *South Africa and how to reach It* and *Golden South Africa*, by the writer of this article; *South Africa, Past and Present* (1877), by John Noble; *Notes on Natal*, by Sir John Robinson, F.R.G.S.; Brooks's *Natal* (1869), by the late Dr Mann; *Laws and Ordinances of Natal*, by Justice Cadiz; *Code of Native Law, Civil and Penal*, by W. Y. Campbell.

Natal, a seaport of Brazil, capital of the province of Rio Grande do Norte, stands at the mouth of the river of that name. It exports principally

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cotton and sugar (nearly £200,000 annually). Pop. 10,000.

Natchez, capital of Adams county, Mississippi, is on the east bank of the Mississippi River, 214 miles by rail and about 280 by water NNW. of New Orleans. It is built mainly on a high bluff, looking out far over the cypress swamps of Louisiana; the part of the city along the bank, where the heavy shipping business (mainly in cotton) is transacted, is known as Natchez-under-the-Hill. The public buildings include a Roman Catholic cathedral and a United States marine hospital. Natchez, which was settled by the French in 1716, derives its name from a former tribe of Indians (see MOUND BUILDERS). Pop. (1870) 9057; (1880) 7058; (1890) 10,101.

National Convention (1792–95). See FRANCE, Vol. IV. p. 780; GIRONDISTS, JACOBINS, ROBESPIERRE.

National Covenant. See COVENANT.

National Debt. National or public debts although of early origin were relatively of small importance before the development of the modern system of banking and credit, and it is only during the present century that they have become almost universal on a considerable scale (see Gilbart on *Banking*, sect. i.). So long as it was necessary either to give pledges such as crown jewels or to assign specified revenues, it was not possible that public debts could attain any great magnitude. As soon, however, as governments were able to borrow simply on credit, national debts in the modern sense of the term grew rapidly. In less than a century after the foundation of the Bank of England (1694), when for the first time in English history the item 'Interest and Management of the Public Debt' appears in the national accounts, Adam Smith felt compelled to enter a protest against 'the progress of the enormous debts which at present (1776) oppress, and will in the long-run probably ruin, all the great nations of Europe.' At that time the public debts of the civilised world were, however, only about one-tenth of their present aggregate amount, which exceeds five thousand million pounds sterling, exclusive of local obligations. Although the English national debt received its greatest augmentation during the great Napoleonic wars, the general indebtedness of civilised nations has increased most rapidly since 1848. In fact since that year it has been calculated that there has been an annual average deficit in the public accounts of the world of over £100,000,000. In 1862 there were quoted on the London Stock Exchange foreign public stocks to the amount of nearly £700,000,000, whilst ten years later these quotations had increased to nearly £2,500,000,000. At the present time there are more than one hundred and fifty public securities dealt in the London market (see Adams on *Public Debts*, part i. chap. i.). Seeing then that national debts are now practically universal in the civilised world, and that the amounts and conditions under which they are held are constantly changing, a purely historical or statistical account is plainly out of the question in the limits of the present article. It will only be possible to indicate the most general characteristics and principles involved, and also some of the leading points of controversy. As regards *origin*, undoubtedly the most important cause of public indebtedness is, and always has been, war-expenditure. Thus the Napoleonic wars increased the English debt by over £800,000,000, the United States civil war cost the victors £450,000,000, and the Franco-German war added £200,000,000 to the total of national indebtedness.

In recent years, however, governments have added largely to their indebtedness by borrowing for various public purposes of an industrial or social character. In France especially, in spite of great changes of government, expenditure of this kind has gone on increasing at an alarming rate; the amount of taxation per head of population has increased by seventy per cent., and this is largely due to the growth of administrative functions on the part of the state. In the British colonies also the rapid increase of public indebtedness must be ascribed principally to the same cause. The progress of civilisation necessarily imposes, as Adam Smith, Mill, and other economists have pointed out, new industrial functions upon governments, and it is impossible that these can in all cases be fulfilled in a directly remunerative manner. But, apart from this natural growth, in recent years a quasi-socialistic tendency has become pronounced, which has involved a large increase in public expenditure. The full importance, however, of this element can only be seen when account is taken of local taxation and indebtedness, which would require a separate investigation. It must also be observed that money spent on debts incurred for public purposes may in some cases—e.g. railways, docks, &c., be directly profitable, and in others—e.g. education, be indirectly remunerative.

The *nature* of public debts differs in some respects from that of private obligations. It is held, for example, that the government of a sovereign state has the discretionary power of enforcing the claims of its subjects for payment of the national (as contrasted with domestic) obligations of another state. The interests of bondholders may in consequence give rise to diplomatic intervention and thus lead to political disturbances, as has been shown recently by the action of England and France in Egypt and Tunis respectively. The growth of national indebtedness has, however, hitherto been generally accompanied by an increased sense of responsibility founded on the importance of public credit, and fundamental revolutions in government have not generally given rise to repudiation, although the new government might strongly disapprove of the objects for which the debt was incurred, or the methods by which the money was raised—compare, for example, the history of France during the present century and the recent revolution in Brazil. On several occasions, however, specious arguments for partial repudiation have been urged and met with some popular countenance.

It has been maintained that if a debt has been incurred in a depreciated currency—that is to say, if the government has only received the capital sum borrowed in this form—it is only equitably bound to pay back the principal with an allowance for its depreciation. This position was taken up by some writers as regards the English debt incurred during the period of the bank restriction, when Bank of England notes were inconvertible and depreciated, and more recently the same reasoning was advanced in the United States after the civil war. The obvious answer, however, is that a government would receive so much less capital if the lenders were not assured against uncertain depreciation. The amount actually received for a nominal capital sum will clearly vary, according to the standard in which the payment is to be ultimately met (see Mill's *Political Economy*, bk. iii. chap. xiii.). In the same way it has sometimes been maintained that if a government has borrowed at a discount, and its stock has afterwards risen to par, the fundholders have no equitable right to this rise in value caused by the growth of credit and national prosperity. But again the reply is that the chance of their rise in the future was taken into account by those who made the original advances, and that they would have required so much more interest if they were to be entitled

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simply to a return of the original sum actually advanced. The practical conclusion to be drawn from this argument is that in general it is bad policy for a nation to borrow at a discount, because it is deprived of the opportunity of conversion to a lower rate of interest. Suppose, for example, that a nation can only borrow at par at six per cent., it is better to do this than to borrow nominally at three per cent., and create (roughly) double the amount of capital obligation for the same sum actually received. In the former case every fall in the rate of interest at which the nation can borrow may be taken advantage of by a process of conversion, whilst in the latter case the whole gain accrues to the fundholders. It is of course assumed that the debt may be paid off at any time (or with a short notice), and that payment is not definitely fixed for certain dates. The opposite case of the United States shows the importance of this provision.

It is, however, true as before that the certainty of high interest for a fixed period will operate upon the amount actually given for every nominal hundred, but the point is that the state is better fitted to take advantage of the probable ultimate fall in the rate of interest. A somewhat similar argument has been advanced by Dr Chalmers and others to show that, considering the nature of a state, it is better always to meet current expenses, however extraordinary, out of present taxation, rather than to resort to loans. The contention is that to meet the actual expenditure the government must in some form or other actually take the required amount from the sum total of the national wealth. If it makes a loan it is said that it really takes the capital amount and diverts it from productive purposes, just as effectively as if it obtained the money directly by taxation, but in addition is burdened in perpetuity with the interest. The circumstances under which the national debt of England was so largely increased in the Napoleonic wars no doubt seemed to justify this position. According to a Parliamentary Return of 1869 it was shown that from 1793–1816 the total income raised from taxes amounted to 1149 millions, and the total expenditure, except for the interest on the debt, amounted to 1103 millions. That is to say, for the twenty-three years (apart from the interest on the debt) the whole civil, military, and naval expenditure was less than the amount received in taxes by 46 millions. Now the charge on the original debt before the war was about 9½ millions per annum, or for the twenty-three years about 220 millions. Against this must be set the 46 millions of surplus shown above, leaving on the net deficit for the twenty-three years about 174 millions. But to meet this sum the national debt was by a process of borrowing and repayment actually increased by some £622 millions (see Noble's *National Finance*, p. 3, note). In answer to the general argument, however, it may be pointed out that the borrowing may be made not from the productive resources of a country, but from foreign capital or the general accumulations of the world, or that the loan may absorb wealth which otherwise would not have been saved at all, or may intercept wealth which might otherwise have gone abroad. Mill argues (*Political Economy*, bk. v. chap. vii. sect. i.) that a sufficient test whether the loan is really made from productive capital is given by the effect on the rate of interest. If the rate rises the presumption is that the productive capital has been really drawn upon. This test, however, can only be used with caution, if at all, for the rate of interest depends upon many factors—e.g. the state of credit, the general economic conditions of other nations, &c.; and on the anticipation of the outbreak of war a rise is certain to take place independently of the action upon the productive capital of the country.

The question next arises: Supposing a national debt in existence, should any effort be made to extinguish the principal? The chief arguments against any special exertion towards repayment are the following: (1) It is said that the payment of the interest constitutes a mere transfer of wealth from one class of the community to another, and therefore is no real burden. But in reply it may be urged that all taxation necessarily implies loss both directly and indirectly, the indirect and 'unseen' loss being much greater. Thus in the United Kingdom, whilst the direct expense of the customs duties has been placed at only 3½ per cent., the indirect loss has been calculated by Cliffe Leslie and others at from 20 to 30 per cent. In some cases also the national creditors are foreigners, and in this case the payment of interest must take the form of a real exportation of wealth without any corresponding importation. (2) It is argued that with the natural progress of society industrial countries become more and more wealthy, that the burden of the debt becomes proportionately less, and that its extinction can be more easily effected at a more remote period. It ought to be observed, however, that the rapid accumulations of the past fifty years have been largely due to exceptional and great changes in connection with machinery, railways, telegraphs, financial reform, foreign trade, education, &c., and that although the same causes will remain in operation, the rate of increase may not be so great. It is worth noting that the calculations of Mr Giffen (see *Growth of Capital*) on the accumulations of capital in the United Kingdom for the ten years 1865–75 are less than those for 1875–85. In certain countries also, notably France, population is almost stationary, and in nearly all the marriage rate is declining. (3) It is said that the rate of interest tends to fall, and that therefore by conversion the real burden may become less and less. The recent experience of the United Kingdom and of the United States tends to support this view; but, on the other hand, there are various elements of uncertainty—e.g. the opening up of new countries, the possibility of great wars, &c. (4) It is maintained that the existence of a national debt, which consists practically of perpetual annuities guaranteed by the state, is a national convenience; and further, that if the debt were extinguished, capital would tend to be sent abroad. The answer is that under modern conditions there are many safe investments, and that only surplus capital migrates from a country. (5) It is said that it is unjust to the present generation to impose a burden upon it simply for the benefit of future and probably more wealthy generations; but it may be rejoined that we must consider the continuity of national life, and remember that the present race is supposed to enjoy the benefits of former sacrifices.

On a balance of arguments most economists have approved of the rule that it is advisable to pay off debt, so long as the taxes by which the surplus is raised do not directly or indirectly impose still greater burdens. A bad system of customs and excise duties, for example, by checking the natural development of production and trade, may practically leave the nation poorer than if it had not paid off its debt by such means. On the other hand, if remissions of taxation have, as in the United Kingdom, already been carried so far as to leave the burden of taxation comparatively light, it is better to use any surplus rather for the payment of debt than for a further reduction of taxation. In support of this view, it may be added that the less the previous debt so much the greater would the power of a state be in making a loan in

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case of exceptional need. A nation already overburdened with debt might be obliged, in the case of a great war, immediately to resort to a forced currency, which would be liable to a serious or fluctuating depreciation. An issue of inconvertible notes is generally the worst method of incurring a national obligation, being in reality a species of forced loan. Some years ago a favourite argument against the immediate repayment of public debts was the assertion that there was in progress a natural depreciation of gold, owing to great discoveries and to the use of credit substitutes. This argument must, however, now be reversed, for there can be little doubt that since 1875 the tendency has been towards an appreciation of gold. Such an appreciation of the standard in which most debts have been contracted—in other words, a general fall in prices—makes the real burden of these debts so much heavier. With low prices, including low money incomes, the same amount of nominal taxation involves greater sacrifices on the part of the taxpayers. Accordingly, if the standard is likely to appreciate still further (see BIMETALLISM) and no remedy is adopted, it will be advisable to reduce money debts of all kinds as rapidly as possible. It should also be noticed that 'an old tax is no tax,' and that in a period of prosperity it is not advisable to lessen or abolish taxes which must afterwards be re-imposed. It is preferable to create a surplus for the extinction of debt. The case of the United States with a surplus larger than can be made use of, and raised to a great extent by burdensome indirect taxation, may be regarded rather as an exception which proves the rule.

In conclusion, attention may be called to the principal methods adopted for the extinction of public debts. These are mainly two, with variations in detail. First, there is the simple plan of raising directly more in revenue than is required for expenditure, and devoting the surplus directly to the purchase of the bonds or stock representing the debt. A continuous surplus of this kind is a real sinking fund. In former times many fallacies have been current regarding the powers of a sinking fund. Financiers have been deluded through spurious figures on the powers of indefinite accumulation of a small sum at compound interest, and have imagined that if a certain sum were set aside and allowed to grow in this manner, it would insensibly extinguish any debt. If, however, in the meantime, the state, as in the case of England during the Napoleonic wars, continues to borrow at higher rates, a sinking fund of this kind is directly worse than useless, although indirectly it may find defenders on the ground that a suspension would injure the national credit. The second method of repayment which has met with much favour in the United Kingdom is the substitution of terminable annuities, at a higher rate, for the perpetual annuities which constitute the interest on the debt. The great advantage of this plan is that there is so far no apparent surplus which the government or the people can devote to a reduction of taxes or to new modes of expenditure, whilst a sinking fund is always open to attack. If the stock has originally been issued at a discount, and a rise may be expected, the adoption of terminable annuities gives the nation the benefit of this rise, whilst the gradual diminution of the debt of itself increases the tendency to rise.

A third method of getting rid of public debts has sometimes been proposed, founded upon the fact that a state can borrow on lower terms, or that its credit is better than is the case of private individuals or companies. Thus it is argued that the state might purchase the railways, the ordinary stock of which in the United Kingdom earns about four per cent., with money borrowed at less than three per cent. Adam Smith, however, long ago pointed out that a nation can rarely make a profit of any industrial undertaking, and to judge by recent experience, governments are likely to pay far more than the real market value of any stock they may purchase.

DEBT OF UNITED KINGDOM AT VARIOUS DATES.

At the Revolution of 1688	£664,263
At the accession of Queen Anne	12,767,225
At the accession of George I.	36,175,460
At the end of the Spanish war 1748	75,812,182
At the Peace of Paris, 1763	132,716,049
At the end of the American war, 1784	243,063,145
At the Peace of Paris, 1815	861,039,049
At commencement of Crimean war, 1854	769,082,549
In 1890	689,944,026

The debt in 1890 was divided into unredeemed funded debt, £585,959,852; estimated capital of terminable annuities, £71,731,869; and unfunded debt (i.e. debt which the state is not bound to repay), £32,252,305 (including outstanding bonds for purchase-money of Suez Canal shares). In 1750–57 took place the first great consolidation of various stocks (see CONSOLS); in 1888 there was carried out an important conversion of the 'new 3 per cents.,' 'consolidated 3 per cents.,' and 'reduced 3 per cents.;' the 'new stock' issued in their place to bear 2¾ per cent. interest till 1903, and thereafter 2½ per cent. (see also EXCHEQUER BILLS).

DEBT OF PRINCIPAL BRITISH COLONIES (1888).

Canada	£46,860,700	Tasmania	£4,390,920
Newfoundland	694,914	New Zealand	36,979,661
N. S. Wales	44,100,149	Cape Colony	21,836,461
Victoria	34,627,382	Natal	4,535,126
Queensland	25,840,950	India	76,362,868
S. Australia	19,147,700	Ceylon	2,252,413
W. Australia	1,275,200	[Egypt, 1890	106,987,760]

DEBT OF UNITED STATES.

In 1791	$75,463,476	In 1861	$90,580,873
In 1812	45,209,737	In 1862	524,176,412
In 1832	24,322,235	In 1863	1,119,772,138
In 1835	37,513	In 1866	2,773,236,173
In 1838	10,434,221	In 1876	2,180,395,067
In 1850	63,452,773	In 1886	1,783,438,607
In 1857	28,699,831	In 1890	1,722,240,163

At the last-named date, however, the net debt—deducting the cash in the treasury—was 757,915,079 dollars; and of the whole, 764,069,095 dollars bears no interest. The bonds issued to the Pacific railways, which pay over 5 per cent., are included to the amount 64,623,512 dollars.

DEBT OF THE CHIEF EUROPEAN COUNTRIES.

Austria-Hungary—		France, 1890	£1,285,500,000
1889	£234,925,193	Holland, 1889	90,487,524
Austria	88,112,860	Italy, 1890	372,560,000
Hungary	157,792,333	Portugal, 1889	134,298,994
Belgium, 1890	99,599,435	Russia, 1888	746,220,720
Denmark, 1889	10,574,000	Spain, 1888	259,900,000
Germany, 1888	61,500,000	Sweden, 1890	14,257,337
Prussia, 1890	260,236,213	Norway, 1891	6,488,600
Bavaria, 1890	67,020,739	Switzerland, 1889	2,194,920
Saxony	32,182,504	Turkey, 1890	180,000,000

The debt of Brazil is said to be £120,000,000; of Japan, £60,452,000; of Chili, £17,524,600; of Mexico, £16,700,000; of China, £12,505,000.

See the sections dealing with finance and debt in the articles on the several countries; H. C. Adams, *Public Debts* (1888); J. Noble, *National Finance* (1875); P. Leroy-Beaulieu, *Traité de la Science des Finances* (2d ed. 1879); R. Dudley Baxter, *National Debts* (1871); Adolph Wagner, *Die Ordnung der Finanzwirthschaft* (in Schönberg's *Handbuch der Pol. Oekon.*, 3d ed. 1885); Sir Stafford Northcote, *Twenty Years of Financial Policy* (1862); Leone Levi, *History of British Commerce* (2d ed. 1880); A. J. Wilson, *The National Budget* (1882); Adam Smith, *Wealth of Nations* (M'Culloch's ed. 1872), bk. v. chap. iii., and appendix on the *Funding System*; E. W. Hamilton, *An Account of the Operations under the National Debt Conversion Act, 1888, and the National Debt Redemption Act, 1889* (1889); Fenn's *Compendium of the Funds* (ed. by Nash).

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National Gallery, the principal depository of the pictures belonging to the British nation. The present building, which was intended to accommodate the Royal Academy and National Gallery, stands in Trafalgar Square, London, and was finished in 1838 at a cost of £100,000, but was enlarged in 1861, in 1869, in 1876, and in 1887. The nucleus of the National Gallery was the Angerstein collection of thirty-eight pictures, purchased in 1824 for £57,000, and a considerable sum is now annually voted by parliament for the purpose of adding to it, the estimates for 1889–90 showing an expenditure of £14,487. The collection is most valuable to the student of art, and occupies more than twenty-two rooms. The various early and late Italian schools are extensively illustrated; there are good examples of the chief representatives of Italian art, as Raphael, Correggio, Paul Veronese. There are a few good examples of Murillo and Velasquez and the Spanish school; and the great Dutch and Flemish painters, Rembrandt, Rubens, Van Dyck, and the others, are well represented. The last extensive bequest in the department of the 'foreign schools' was that of Mr Wynn Ellis in 1876, comprising ninety-four pictures. In the department of the 'British and modern schools' the largest additions as yet made by private munificence are the gift of Mr Robert Vernon in 1847, consisting of 157 pictures, and the bequest of Joseph M. W. Turner, R.A., in 1856, embracing 105 works in oil and an immense number in water-colours and pencil by his own hand. The entire collection now consists of over 1280 pictures. There are catalogues to the Gallery by Blackburn (1877, 1879), E. T. Cook (3d ed. 1890), and others, and the *Pall Mall's* Half-holidays at the National Gallery (1890). The Royal Academy of Arts, which used to have its headquarters here, is now established at Burlington House.

The NATIONAL PORTRAIT GALLERY, founded in 1856, was established at South Kensington in 1869, but removed on loan to the Bethnal Green Museum in 1885. In 1891, when the collection comprised nearly 900 portraits, a building for its special use was in progress at the rear of the National Gallery. There is an admirable catalogue by the director, Mr Scharf (1888).

There are also National Galleries of Art in Edinburgh and Dublin; the great public collections of Paris, Berlin, Dresden, Munich, Florence, Rome, &c. are mentioned in the articles on those cities.

National Guard, an organisation for local defence, at the disposal of the municipalities, not of the crown. Such a burgher guard had long existed in many French towns, but it was introduced into Paris only in July 1789, during the Revolution, when the revolutionary leaders decreed the formation of a national guard for Paris of 48,000 citizens; and ere long there were 300,000 for the kingdom. During the revolutionary excesses they were sometimes supine, sometimes they withstood the more violent insurrectionists. In 1794 they were the most devoted adherents of Robespierre. In 1795 they assisted in disarming the people, and were themselves reorganised so as to exclude turbulent elements, none but men of substance being allowed to serve; they even became royalist in feeling, and, rebelling against the convention, were defeated by Napoleon and the regular army, and practically ceased to exist. Napoleon re-established a national guard or militia, but, after various vicissitudes in 1814, 1830, and 1845, it has been wholly superseded by the military reorganisation since 1870.

National Hymns. The origin of the English national anthem has been a subject of controversy since the end of the 18th century, and is still involved in obscurity. 'God save the King' was first *printed* in the *Harmonia Anglicana* of 1742, without name of author or composer, varying slightly from the present version; and in 1745, during the Scottish rebellion, it became widely known, versions of it being sung nightly at Drury Lane and Covent Garden Theatres with great applause. Of the numerous claims to its parentage, the view supported by most, and by several eminent writers, attributes it, both words and music, to Henry Carey (q.v.), the popular song-writer, about 1740. The evidence for this is given in Chappell's *Popular Music of the Olden Time*, and Chrysander's *Jahrbücher*, vol. i. But Mr W. H. Cummings, who thoroughly beat out the subject in a series of papers in the *Musical Times* in 1878, entitled to the greatest weight, considers this evidence unreliable; and he arrives at the conclusion that the music has been adopted (but when, and by whom, we shall probably never know) from an 'Ayre' by Dr John Bull (q.v.), found (without words) in a collection of music by him once in the hands of Dr Kitchener, afterwards of Richard Clark, the original of which seems to have disappeared. See also a paper by Major Crawford in the *Dictionary of Hymnology* (1891), by the Rev. John Julian.

The hymn was translated into German by Heinrich Harries, a Holstein clergyman, and sung to the original air at a birthday celebration in honour of the king of Denmark in 1790; and an adaptation from these words, made in 1793 by Dr B. G. Schumacher, beginning 'Heil dir im Siegerkranz,' has ever since been in use as the Prussian national hymn. It called forth the admiration of Beethoven and Haydn, and moved the latter to compose the Austrian national hymn, which was first sung on the Emperor Franz's birthday in 1797. The words now used, beginning, 'Gott erhalte Franz den Kaiser,' are by Baron Zedlitz; the original words were by Haschka. The Hungarians have two national hymns—the *Szózat* ('The Appeal'), beginning, 'Be true to the land of thy birth,' written by Vörösmarty (1800–55), the creator of Hungarian poetry of the Romantic school, and composed by Benjamin Egressy, an actor and eminent composer of sacred music; and the *Magyar Hymnusz*, written by Kölcsey and composed by Francis Erkel. The Rákóczy march, by an unknown composer, dates from the end of the 17th century. The simple and dignified Russian national anthem dates from 1830, and is the work of General Alexis Lwoff (1799–1870). Of the Danish national hymn, 'Kong Christian,' the words are by Ewald and the music by Johann Ernst Hartmann (1726–91). There are several claimants to the honour of being the Norwegian national hymn, of which may be mentioned 'Sönner af Norge,' written about the beginning of the 19th century, music by C. Blom; and the modern 'Ja, vi elsker dette Landet' (Yes, we love this land), words by Björnson, music by R. Nordraak. The Swedish hymn, 'King Karl, the young hero,' was written by Esaias Tegner (1782–1846). The Dutch national hymn, 'Wien Neerlandsch Bloed,' was written by Henrik Tollens (1780–1856), and composed by J. W. Wilms. 'La Brabançonne,' the Belgian revolutionary song of 1830, was written by Jenneval, a Brussels actor, and composed by Campenhout. The 'Marseillaise' (q.v.) of the French was written and composed in 1792 by Claude Joseph Rouget de Lisle (1760–1836), and received its name from being sung by the volunteers from Marseilles who took part in the movements in Paris in that year. Various doubts have been thrown on De Lisle's authorship of the tune, but these were finally disposed of by a pamphlet written by his nephew in 1865. The Portuguese 'Hymno constitucional' was composed by Dom Pedro I., emperor of Brazil. Though scarcely to be classi-

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fied as a hymn, 'Yankee Doodle' is the American air, notwithstanding the more recent rival claims of 'Hail Columbia' and 'The Star-spangled Banner,' neither of which have high intrinsic merit or have taken any great popular hold. More like a hymn is the song 'America,' which is sung to the tune of 'God save the King.' The origin of 'Yankee Doodle' is as obscure and disputed a point as that of 'God save the King.' The most probable account ascribes to the tune an English origin, and the words to Dr Schuckburgh, an army surgeon, about 1755, soon after which, during the American revolution, it came extensively into vogue. It was first printed in Arnold's opera, *Two to One*, in 1784.

National Park. See YELLOWSTONE, and YOSEMITE. In Canada a domain 26 miles by 10 in extent has been set aside as a national park at Banff in Alberta (by rail 562 miles NE. of Vancouver and 920 W. by N. of Winnipeg). It embraces one of the most beautiful sections of the Rocky Mountains, contains hot sulphur-springs, has a handsome railway hotel, and is popular as a pleasure-resort. Roger's Pass, 135 miles to the west, is also reserved as a government park. See also NIAGARA.

Nations, LAW OF. See INTERNATIONAL LAW.

Nativity. See ASTROLOGY.

Natrolite, one of the most common of the group of minerals known as *Zeolites* (q.v.).

Natron, or TRONA, an impure sesquicarbonate of soda, which always contains sulphate of soda and chloride of sodium. It is obtained from the margins of lakes in Egypt, Siberia, Tibet, &c., and from the borders of the Black and Caspian Seas.

Natron Lakes, eight in number, are in a depression to the west of the Damietta branch of the Nile. The locality is renowned for four monasteries, from whose libraries of Arabic, Coptic, and Syriac MSS. various European collections have been enriched. In the time of St Pachomius 5000 anchorites dwelt here.

Natterjack. See TOAD.

Natural History, in its widest and oldest sense, includes all the concrete sciences, but psychology and sociology have been separated off at the one end of the series, physics and chemistry and all their branches at the other, so that natural history became synonymous with the science of living things. Most frequently, however, it simply means zoology, especially in so far as that is concerned with the life and habits of animals. See BIOLOGY, BOTANY, EVOLUTION, SCIENCE, ZOOLOGY.

Naturalisation is the process whereby an alien is invested with the privileges and made liable to the obligations of a natural-born citizen. It implies the renunciation of one political status and the adoption of another. Formerly many states absolutely refused to recognise any act of naturalisation as exempting the party naturalised from the consequences of his allegiance. Thus, the maxim of English common law, *Nemo potest exuere patriam*, precluded a natural-born subject from adopting a new political status, and rendered him liable to the penalties of treason if found in arms against his native country. The existence of this principle gave rise to many disputes, more particularly between Great Britain and the United States. It was not, however, till the Naturalisation Act of 1870 that the doctrine of the indelibility of natural allegiance was formally abandoned by Britain. In the same year a treaty was entered into between Great Britain and the United States, which provided that British subjects becoming naturalised in the United States should be treated in all respects as United States citizens; and a corresponding provision was made with respect to United States citizens becoming naturalised in British dominions.

The conditions on which naturalisation will be allowed by the state to which the applicant seeks to affiliate himself vary in different countries. In Great Britain naturalisation is effected either through a special act of parliament or under the Naturalisation Act, 1870 (33 and 34 Vict. chap. 14). This statute, wherein are embodied the present regulations with reference to naturalisation, provides that any foreigner who has resided in the United Kingdom for five years, or has for that period held service under the crown, can obtain a certificate of naturalisation from one of the principal secretaries of state. On the granting of this certificate he is entitled to all political and other rights, powers, and privileges, and is subject to all the obligations to which a natural-born British subject is entitled or subject. The only qualification is that he shall not, when within the limits of the foreign state of which he was previously a subject, be deemed to be a British citizen unless he has ceased to be a subject of that state. British colonies have the power of making their own regulations on the subject of naturalisation, but such regulations have effect only within the limits of the colony. In the United States a foreigner must make a declaration on oath of his intention to become naturalised. This oath may be taken before any superior, district, or circuit court, and the applicant must renounce any title of nobility. After the lapse of two years from the date of this declaration, and after five years' residence in the United States, he becomes an American citizen, and a certificate of naturalisation is issued to him. There is, however, no uniform system of registration of such certificates, and, as there are about 3000 federal and state courts having power to grant them, great difficulties sometimes arise in proving naturalisation. In France a foreigner who has obtained permission to become domiciled in France is entitled to letters of declaration of naturalisation after three years' residence. Also, by the French Naturalisation Act, 1889, a foreigner who has resided in France for ten years may at once be naturalised without preliminary ceremony. In Germany naturalisation can be conferred only by the higher administrative authorities; the applicant must show that he is at liberty, under the laws of his native country, to change his nationality, or, if he is a minor, that his father or guardian has given him the requisite permission, that he is leading a respectable life, that he is domiciled in Germany, and that he has the means of livelihood. In all countries a married woman is held to be a citizen of the state of which her husband is for the time being a subject, and the naturalisation of a father carries with it that of his children in minority. In countries where military service is compulsory naturalisation in fraud of this either is prohibited or renders the offender liable to imprisonment, if he returns, and forfeiture of all property subsequently acquired in his native country.

Certain privileges of British nationality may be acquired by the issue to an alien of letters of denization granted by the crown; and for this no previous residence is required. A denizen acquires his limited privileges as from the date of the letters, and not from the date of his birth; a naturalised person, on the other hand, is placed in the same position as if he had been from birth a British subject. The difference was important so long as aliens could not inherit land; for a denizen, being without inheritable blood, could not inherit land, nor could his issue, born before his denization, inherit it from him. Since the Naturalisation

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Act has swept away all the disabilities to which aliens were subjected in the taking, holding, and inheriting of land (see ALIEN), the distinction between denization and naturalisation is of little practical importance. It is, however, to be observed that the statute (12 and 13 Will. III. chap. 2, sect. 3) which disqualifies a denizen from being a member of the Privy-council or of parliament, and from holding any office of trust, civil or military, still remains in force.

See the standard works on international law; *Nationality*, by Chief-justice Cockburn (1869); and *La Nationalité*, by Cogordan (2d ed. 1890).

Naturalism, a term once used as almost equivalent to Deism, and sometimes for nature-worship, also for brutish defiance of moral law, is now usually employed as synonymous with Realism (q.v.) in art, literary or other.

Natural Philosophy is a term still frequently employed in Great Britain to designate Physics (q.v.), or the branch of physical science which has for its subject those properties and phenomena of bodies which are unaccompanied by any essential change in the bodies themselves. See SCIENCE.

Natural Selection. See DARWINIAN THEORY.

Natural Theology. See APOLOGETICS, and THEOLOGY.

Nature-printing, a process by which engravings or plates answering thereto are produced by taking impressions of the objects themselves, and printing from them, invented or improved about 1853 by Alois Auer of Vienna. Suitable objects—for they must have tolerably flat surfaces—such as dried and pressed plants, embroidery and lace, are placed between a plate of copper and another of lead, both worked smooth, and polished; the plates are drawn through a pair of rollers, under pressure; then, when the plates are separated, it is found that a more or less perfect impression of the object has been made in the leaden plate. This may be used directly as an engraved plate, if only a very few impressions are wanted; or a facsimile of it may be obtained in copper by the electrotype process. Nature-printing has been superseded by photographic methods. See ILLUSTRATION, PHOTOGRAPHY.

Nau'cratis, an ancient city of Egypt, situated in the Nile delta, near the modern village of Nebireh, 47 miles SE. of Alexandria, existed in the 7th century B.C. It was the only city in Egypt at which the Greeks were allowed to trade; was celebrated for its artistic pottery; and was a centre for the worship of Aphrodite. The site was discovered by Flinders Petrie in 1884, and excavated by him in that and the following year. His monograph *Naukratis* (1886) gives an account of the ruined temples and the many valuable archæological discoveries made on this site.

Naugatuck, in Connecticut, on the Naugatuck River, 22 miles by rail NNW. of New Haven, contains the factory of the Goodyear Glove and Rubber Company, and also manufactures cutlery and ironwares. Pop. 4274.

Naumachia, a Greek word signifying literally a naval battle; afterwards, among the Romans, a spectacle which consisted in the imitation of a naval battle. Julius Cæsar was the first to introduce a naumachia into Rome, 46 B.C., causing a portion of the Campus Martius to be dug to form a lake, on which the spectacle came off. Augustus also made an artificial lake near the Tiber for the same purpose, and Claudius employed Lake Fucinus, where on one occasion 19,000 combatants were engaged for this purpose. The combatants were for the most part either captives or condemned criminals. These *naumachiæ* were not *sham-fights* any more than were ordinary gladiatorial combats; both sides fought on in real earnest for dear life until one was utterly overpowered.

Naumburg, a quaint old town of Prussian Saxony, on the Saale, in an amphitheatre of vine-clad hills, 30 miles by rail SW. of Leipzig. Of its six churches, the triple-towered cathedral (1207–42) is a noble Romanesque and Gothic structure. The manufactures include ivory carvings, combs, hosiery, wine, &c. The yearly 'cherry feast' commemorates the raising of the siege of Naumburg by the Hussite leader Procopius in response to the supplication of the children (28th July 1432); but recent historians cast doubt on the whole episode. The seat of a bishopric (1059–1564), Naumburg suffered much in the Thirty Years' War; in 1814 it came to Prussia. Pop. (1875) 16,258; (1885) 19,107. See works by Puttrich (1843) and Mitzschke (1881).

Nauplia, a small fortified town and seaport with an excellent roadstead in the Morea, Greece, at the northern extremity of the Gulf of Argos or Nauplia, 25 miles S. of Corinth. At an early period it was the port and arsenal of Argos. In the 13th century it was occupied by the Venetians (who called it Napoli di Romania), and it was taken by the Turks in 1540. From 1824 to 1835 it was the capital of Greece, and had a population of upwards of 12,000; but on the removal of the court to Athens it fell into decay. Pop. 4598.

Nauplius. See CRUSTACEA.

Nausea is a distressing sensation always referred to the stomach. It is unattended by pain, but is usually accompanied by a feeling of general languor or debility, a small and often irregular pulse, a pale, cool, and moist skin, general muscular relaxation, an increased flow of saliva, and a sensation that vomiting will supervene. It is most commonly a *direct* symptom of disease or disorder of the stomach, but sometimes it is a very important *indirect* symptom of disease of some part at a distance from the stomach—as, for example, the brain or the kidney. The nausea which is so troublesome to pregnant women is due to the irritation excited by the enlarged uterus being reflected by nervous agency to the stomach. Sea-sickness is separately discussed.

Nautch Girls, or BAYADÈRES, public female dancers in India and the East Indies. Their performances constitute a principal part in the spectacular entertainment called a nautch or natch.

Nautical Almanac. See ALMANAC.

Nautilus, a remarkable mollusc in the class of Cephalopods, the only surviving member of a race once abundant. It differs conspicuously from the other extant Cephalopods or 'cuttle-fish' in possessing a shell, within the outermost chamber of which it lives, while the lobes of the 'foot' round about the mouth bear numerous tentacles retractile into sheaths, the 'siphon' consists of two free folds, the eyes are open sacs without cornea or lens, there are four gills and four kidneys, and there is no ink-bag. The spiral shell, coiled in one plane like that of the water-snail Planorbis, differs from this in being chambered; moreover, the foot or ventral side of the enclosed animal is towards the outside in Nautilus, towards the inside in Planorbis. When young the Nautilus lives in a small shell bent like a horn; with growth this is increased spirally, but as the animal periodically draws itself onwards and closes a door behind it, a chambered spiral results, in which the original shell is in the very centre. The successive chambers are all connected, however, by an organic, partially calcareous tube; and all except the outermost, in which the animal

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lives, are filled with gas—apparently a mixture of oxygen and nitrogen somewhat different from air. The outside of the shell is covered with a thin

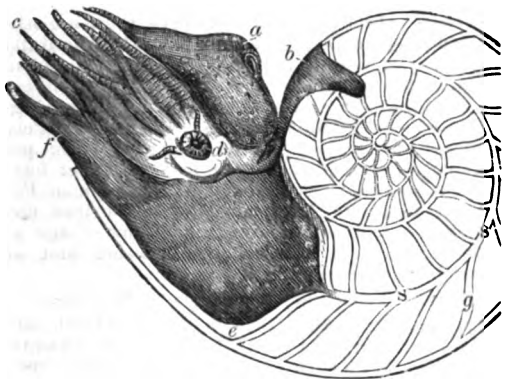

Fig. 1.—Pearly Nautilus (after Owen). Contracted spirit specimen, with the shell in section:
a, dorsal 'hood'—a portion of the 'foot;' *b*, a portion of the mantle reflected on the shell; *c*, tentacles; *d*, eye; *e*, ventral side of visceral hump; *f*, funnel; *g*, a partition between two chambers; S, siphuncle or tube traversing the chambers.

organic layer, beneath which there is a porcelain-like stratum with bands of colour, while internally the lime has the usual mother-of-pearl structure, the lustre of which, often artificially exposed by the use of acids, has earned for the animal its common name of Pearly Nautilus.

Though the Nautilus seems to have been known to Aristotle, and though the shells have always been familiar, our knowledge of the animal itself is almost wholly due to the investigations of Owen, and to some interesting observations (1705) by the Dutch naturalist Rumphius. The rarity of specimens, so evident from the fact that only one was collected on the *Challenger* expedition, is mainly due to its habitat in somewhat deep water. But it must also be noted that the natives of Fiji, the New Hebrides, the Moluccan Islands, &c. catch the animal in lobster-pots and eat it with relish. The Nautilus probably creeps or gently swims along the sea-bottom, feeding on crustaceans and the like; but it is also seen floating on the surface, probably washed up by storms and injured by the waves. The species best known is *Nautilus pompilius*, but there are probably four or five others, while the fossil relatives are reckoned in hundreds.

The *Paper Nautilus* (*Argonauta*) is a very different animal, like an octopus except that the

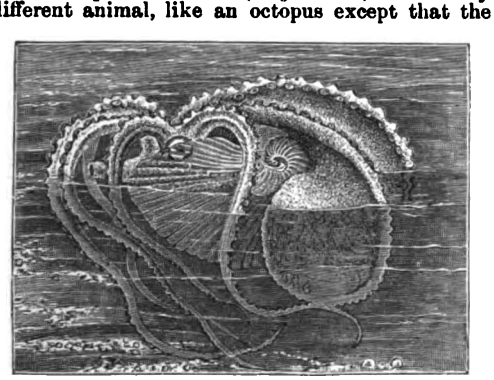

Fig. 2.—Female Paper Nautilus, showing the two modified arms which make and embrace the shell.

female bears a beautiful, translucent, ribbed shell in which the eggs are sheltered. But this shell is not in any way comparable to that of the Nautilus or of other molluscs; it is a cradle, not a house; it is secreted and embraced by two broadened dorsal 'arms,' not by the mantle; it is unchambered and peculiar to the females. The Argonaut was credited by Aristotle with the power of lifting its broad arms, and of thus sailing before the wind, but there is no truth in this fancy often reiterated by poets and naturalists. For the Argonaut squirts water from its funnel and swims backwards like any other cuttle-fish, or else creeps along the bottom. At the breeding season it is a pelagic surface swimmer in tropical seas, at other times it seeks the depths. The male measures little more than an inch in length, only about a tenth of the size of his mate, and he is also notable for the modification of one of the arms into a detachable sac of spermatozoa, formerly mistaken for a parasitic worm. Some half-dozen living species are recorded. See CEPHALOPODA, CUTTLE-FISH.

Nauvoo' (from Heb. *nāvār*, 'to be beautiful'), a village of Illinois, on the east bank of the Mississippi River, 14 miles above Keokuk. It was built by the Mormons (q.v.) in 1840, and in a few months contained a population of 15,000. Its principal feature was a great temple of white limestone (1841–45); but it had also mills and factories, and the beginnings of a university, and was for a few years a prosperous and happy town. After the expulsion of the Mormons in 1846, the temple was half destroyed by fire in 1848, and further ruined by a tornado in 1850. The town was afterwards bought and occupied for a while by a French Socialist community.—The *Nauvoo Legion* was a Mormon military organisation, embracing all the males between the ages of sixteen and fifty, founded here in 1840, and reorganised in Utah in 1857. In 1870, when it mustered for the last time, it numbered about 13,000 men.

Naval Cadets. See CADET, MIDSHIPMAN.

Naval Reserve, ROYAL, is a sort of militia auxiliary to the royal navy. It is a force held in high esteem by naval men, and is considered an extremely valuable reserve of trained men ready to man the fleet in case of emergency. The act under which the force was instituted in 1859 authorises the engagement of 30,000 men, each for a period of five years, and provides that each shall be trained for twenty-eight days in every year to the use of arms and in naval gunnery, either in ships of the navy or on shore. In case of national emergency, these men can, by royal proclamation, be called out for service in the navy in any part of the world, for periods not exceeding five years. While training and while called out for actual service, the men receive the same wages as corresponding ratings in the royal navy; and in addition they receive a retaining fee for every year of training completed, the amount of which is regulated according to the class of the reserve in which they are enrolled; this is £6 a year for men in the first class, and £2, 10s. with a suit of clothes for the second class; boys in the third class receive no retainer, but the fourth class, consisting of stokers, receive £5 a year. On actual service, after three years—whether of uninterrupted service or at broken intervals—the volunteer becomes entitled to twopence extra per diem. The man can terminate his engagement at the end of five years, unless on actual service, when he may be required to complete five years of such service before discharge. During the continuance of his engagement he must not embark on voyages which shall entail a longer absence from the United Kingdom than six months, unless with special permission of the Admiralty. The periods for training are made as

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far as practicable to suit the sailor's convenience: he may break the twenty-eight days into shorter periods, none being less than seven days. Penalties are enforced if men fail to attend; and failure after proper notice to come up for actual service is held equivalent to desertion. While training or on duty the men are liable to all the punishments, as they are entitled to all the rights and privileges, of regular seamen. The men considered most desirable are (1) those having fixed residences, and personally known to the registrar or his deputies; and (2) men having regular employment in the coasting trade, or in vessels the business of which brings them back to the same ports at frequent and known intervals. In 1861 the system of the Reserve was extended to officers of the merchant-service, certificated masters and mates being respectively granted commissions in the Naval Reserve as lieutenants and sub-lieutenants. The holders are required to train for twenty-eight days annually on board Her Majesty's ships, and are liable to be called out for actual service when required. The number of these officers allowed by regulation is 130 lieutenants and 270 sub-lieutenants.

The Royal Naval Reserve now contains four classes of men. (1) The first class comprises men under thirty years of age, who must prove at least six years' sea-service within ten years, and of these six years' service two at least as able seamen in foreign-going or coasting vessels, and must declare that it is their intention to follow the sea-service for a period of at least five years. Six months' service as skipper or second hand in first-class fishing-vessels in the English Channel and North Sea may be accepted in lieu of two years' service as able seamen. Men discharged from the navy as able seamen with good characters may be enrolled in the first class up to thirty-five years of age, also men who have previously served in the Royal Naval Reserve. (2) The second class contains men with the proper qualifications between nineteen and thirty years of age, who have been at sea on foreign-going, coasting, or fishing vessels for three years, of which at least six months must have been with the grade of ordinary seaman; and they must sign a declaration that it is their intention to follow the sea for a period of at least five years. Apprentices who have completed their indentures for a term of not less than three years may be enrolled in this class without further proof of service. (3) The third class comprises boys, not under fifteen nor above sixteen and a half years of age, who have been eighteen months under training in a mercantile training-ship, or have been educated at Greenwich Hospital, are under engagement to join a merchant-ship, are physically and mentally qualified, and can show proficiency in navigation and gunnery and seamanship; they must produce certificates of good character from the captain or superintendent. In the case of the Marine Society's ship *Warspite*, boys will be received with nine months' training. They may be promoted to the second class at the age of nineteen after six months' service at sea; and in due time to the first class. (4) The fourth class consists of firemen. A candidate must be over twenty and under thirty-five years of age; he must produce certificates of good character, conduct, and ability as fireman from his last employer, for not less than six months in foreign-going or regular coasting vessels within the twelve months previous to his application. Every enrolment is for five years; and when a man is promoted to a higher class he must re-enrol. The annual training may be accomplished either on board a ship of war or at a Naval Reserve battery. In 1889 the total number of reserve men drilled was 18,869, of which number 8294 were receiving an extra penny a day as trained men. The officers of all ranks now number 556 and the men 19,851, the cost amounting to £293,778.

Besides the Royal Naval Reserve, there are other Naval Reserve forces at command of the Admiralty. Of these the most important are the Coastguard (q.v.); the Royal Naval Artillery Volunteers (see VOLUNTEERS); and a force drawn from amongst the seamen pensioners (see PENSIONS). Petty officers and seamen of the navy, on being pensioned for length of service, may, if under forty-five years of age, be enrolled in the Seaman Pensioner Reserve. They must serve fourteen days annually, and on reaching fifty years of age get the Greenwich Hospital age pension and are exempt from further drill.

Naval Tactics. See TACTICS (NAVAL).

Navan, a market-town in County Meath, situated at the junction of the Boyne and Blackwater, 16 miles W. of Drogheda by rail. Pop. 3873, almost all Catholics.

Navarino (also *Neocastro*, and officially *Pylos*), on a bay on the south-west coast of the Morea in Greece, contains only 2000 inhabitants, but has an excellent deep harbour, the best in Greece. The ancient Pylos, the city of Nestor, stood near. The Bay of Navarino was the scene of a great sea-fight between the Athenians under Cleon and the Spartans (425 B.C.), in which the latter were defeated; and on the 20th October 1827 it saw the annihilation of the Turkish and Egyptian navies by the combined British, French, and Russian fleets under Sir Edward Codrington.

Navarre (Basque *Nava*, *naba*, 'a mountain plain,' and *erri*, 'country;' there is also a Basque word *Nabarra*, 'variegated'), formerly one of the kingdoms which arose in the Pyrenees after the downfall of the Goths, has since 1512 been divided into Spanish Navarra, and French or Basse-Navarre (now Basses Pyrénées). Spanish Navarra, by far the greater, is bounded N. by France, E. by Aragon, S. partly by the Ebro, partly by Castile and Aragon, and W. by Alava and Guipuzcoa. The area is somewhat over 4000 sq. m.; pop. 308,000, or 72 to the square mile. It is one of the most varied provinces of Spain in surface and climate; within sight of the Atlantic at its north-west corner, the rainfall is there one of the heaviest in Europe, while in the south-east the steppes of the Bardenas Reales are almost sterile for want of water, and at Tudela we encounter Moorish modes of irrigation, supplemented by the canal of Charles V. The mountains of the northern frontier range, west to east, from 3000 to 8000 feet of altitude; in the interior they reach occasionally 5000. With the exception of the Bidassoa, which enters the Atlantic at the inner angle of the Bay of Biscay, the numerous other streams flow at right angles to the Pyrenees, and are all affluents of the Ebro; the principal are the Aragon, Arga, and Ega. The mountain-valleys are narrow but fertile. By the energy of the Basques, who do not live like the Spaniards only in towns and villages, cultivation is carried on almost everywhere. The chief productions are maize, wheat, chestnuts, apples, and a strong red wine. Cattle abound, but not many sheep or horses. Minerals are found in the Pyrenees, and mines of argentiferous lead, copper, and iron are worked; rock-salt also is found in the province. The wild animals include the bear, wolf, roe-deer, izard (ibex) in the mountains of the Aragonese frontier; foxes, wild cat, genette, otter, marten, &c. are in sufficient numbers to make commerce of their skins. The population of Navarre (150,000) is bilingual; from a little to the south of Pamplona northwards Basque prevails;

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to the south Spanish only is spoken. Until now Spanish has encroached far more on Basque in Navarra than has French in Basse-Navarre.

History.—In Roman times the country now called Navarre was occupied by the Iberian Vascones, who have given their name both to Basques and Gascons. Within historic times there has been a strong Celtic element in the country. The capital, Pamplona (*Pompeiopolis*), recalls the Roman Triumvir, but the older native name, Irun (*Irunean*), is often on books printed at Pamplona. The subjection of the Vascones to the Visigoths was nominal only. On the downfall of the latter and the incursion of the Arabs the mountains of Navarre became one of the early centres of resistance and of reconquest. From the native chiefs, or counts, arose the first dynasty of Navarre—Garcia Jimenez (860) to Sancho the Strong (1234). The history of Navarre is full of interest. In 778 the rout of Charlemagne's rear-guard, and the death of Roland at Roncesvalles, furnished a theme for countless poems and romances. With Aragon and Castile Navarre shares the honour of being one of the first countries in which parliamentary rule with representation of towns and commons (*Universidades*) obtained. The Cortes (*Curiæ*) arose out of the Councils, and there was regular representation of the three orders before the close of the 12th century. During this period Navarra gained its name and modern limits, but under Sancho the Great (1028–35), and again (1109–34) under Alfonso I., it seemed as if the union completed under Ferdinand and Isabel would have taken place three or four centuries earlier. Sancho the Strong left no male heirs, and the future succession of Navarre was singularly broken from the same cause. The crown passed to Thibaut, count of Champagne, through the younger daughter. There were three kings of this house from 1234–84, when the crown passed by marriage to Philippe le Bel of France. Five kings of France (1284–1328) reigned over Navarre, when, through the female succession, it passed to Philippe, count of Evreux; three kings of this line succeeded—Philip III., Charles II. the Bad, and Charles III. Under them Navarre reached its highest prosperity; most of the architectural beauties of Navarre date from this period, 1328–1416. Navarre had been always closely connected with Aragon, and three of its kings had already borne the title of Aragon and Navarre. Blanca, the daughter of Charles III., married first Martin, king of Sicily, and after his death Juan II. of Aragon. Civil war arose between him and his son, Don Carlos, Prince of Viana, one of the most interesting characters of his time. The factions of Beaumont (Don Carlos) and of Agramont (Juan II.) proved the ruin of Navarra. Henceforth her jealous neighbours could always rely on the support of one or other in their encroachments. Leonor, the daughter of Juan II., married Gaston of Foix, and thus Navarre became united to Bearn; her granddaughter, Catharine de Foix, married Jean d'Albret in 1486, and during their reign in 1512 the Duque d'Alba conquered Navarra, which has since been united with the Spanish crown. French Navarre was joined to that of France by the accession of Henri of Navarre in 1589, but the formal union was not completed until 1620 by Louis XIII. After its union Spanish Navarre was governed by a viceroy, and retained its own cortes, mint, style of kings (Carlos III. of Spain was VI. of Navarra, &c.), power of taxation, and *Fueros* (q.v.). These privileges were almost wholly lost by the first Carlist war (1833–39), and were still more diminished by the second (1872–76). Navarra is now one of the forty-nine provinces of Spain, with merely local self-government in minor matters in certain districts. In France Basse Navarre preserved its *fueros* till 1789, refused to send deputies to the States-general as part of France, and declared that it would only accept the new constitution if it were better than its own. The *fueros* of Navarre are more like those of Aragon than those of the Basque Provinces. In their written form they are probably not older than the 13th century, but many provisions point back to a higher antiquity. The seven *Fazanias* (precedents) are in the form of apologues, animals are considered as morally responsible and guilty of *homicide* towards each other, marriage is a civil right, the children of a concubine (*barragana*) are provided for, compurgation is in full force, and social excommunication is inflicted on those who will not conform to the customs. Toleration is extended to Moors and Jews, and the oath to be taken by the latter is very long and curious. In the Cortes the power of taxation was secured by supplies being withheld until all grievances had been redressed. With consent of the Cortes the king might amend, but could not impair the *fueros*. Navarre was a frontier of the English possessions in south-west France from 1152 to 1453. Richard I. and Henry IV. married princesses of Navarre; had the former had issue, they would have been heirs of Navarre in preference to the counts of Champagne. Charles the Bad was the ally of the Black Prince, who passed through his dominions to Navarrete. Wellington blockaded Pamplona, and marched through Navarre in 1813–14.

See P. J. Moret, *Investigaciones Historicas del reyno de Navarra* (1 vol. 1665) and *Anales del reyno de Navarra* (3 vols. Pamplona, 1684)—both reprinted by E. Lopez of Tolosa in 1890–91; Tanguas, *Diccionario de las Antiguedades de Navarra* (4 vols. Pamplona, 1840–43); *Fuero General de Navarra* (Pamplona, 1869); *La Navarre Française*, par M. G. B. de Lagrèze (2 vols. Paris, 1881); the decisions of the Cortes under title *Quaderno de las Leyes y Agravios Reparados, &c.*, vol. vii., and V. de la Fuente, *Estudios Criticos sobre la Historia y el Derecho de Aragon*, vols. i. and ii. (Madrid, 1884–85).

Nave. See CHURCH.

Navew (Fr. *navette*), a garden vegetable much cultivated in France and other parts of the continent of Europe, although little used in Britain. It is by some botanists regarded as a cultivated variety of *Brassica napus*, or Rape (q.v.), whilst others refer it to *B. campestris*, sometimes called Wild Navew, the species which is also supposed to be the original of the Swedish Turnip (q.v.). The part used is the swollen root, which is rather like a carrot in shape. Its colour is white. Its flavour is much stronger than that of the turnip. It succeeds best in a dry, light soil. The seed is sown in spring, and the plants thinned out to 5 inches apart. *Wild Navew* is extensively cultivated in the north of France and Holland for the sake of its seed, which yields Colza oil.

Navicular Disease, in the horse, consists of an inflammation, often of a rheumatic character, of the small bone—the navicular—below which passes the strong flexor tendon of the foot. It is most common amongst the lighter sorts of horses, and especially where they have upright pasterns, out-turned toes, and early severe work on hard roads. It soon gives rise to a short tripping yet cautious gait, undue wear of the toe of the shoe, and projecting or 'pointing' of the affected limb whilst standing. Even when early noticed and in horses with well-formed legs, it is incurable; and when of several weeks' standing it leads to so much inflammation and destruction of the tendon and adjoining parts that soundness and fitness for fast work again are impossible. In order to reduce the pain and inflammation, rest should at once be given, the shoe removed, the toe shortened,

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and the foot placed in a large, soft, hot poultice, changed every few hours. Laxative medicine and bran mashes should be ordered, and a soft bed made with old short litter. After a few days, and when the heat and tenderness abate, cold applications should supersede the hot; and after another week a blister may be applied round the coronet, and the animal placed for two months in a good yard or in a grass field, if the ground be soft and moist; or, if sufficiently strong, at slow farm-work on soft land. Division of the nerve going to the foot removes sensation and consequently lameness, and hence is useful in relieving animals intended for slow work. The operation, however, is not to be recommended where fast work is required, for the animal, insensible to pain, uses the limb as if nothing were amiss, and the disease rapidly becomes worse. Navicular disease is very often due to hereditary taint; hence horses suffering from it should never be used for breeding purposes.

Navigation Laws. The importance of the early maritime codes in developing International Law is indicated in that article. Laws restricting foreign trade and supposed to be in favour of native commerce and shipping are of very ancient date. Thus, in England, by a statute of Richard II., in order to augment the navy of England, it was ordained that none of the lieges should ship any merchandise out of the realm except in native ships, though the statute was soon evaded and seldom followed. At length in 1650 an act was passed with a view to stop the gainful trade of the Dutch. It prohibited all ships of foreign nations from trading with any English plantation without a license from the Council of State. In 1651 the prohibition was extended to the mother-country, and no goods were suffered to be imported into England or any of its dependencies in any other than English bottoms, or in the ships of that European nation of which the merchandise was the genuine growth or manufacture. At the Restoration these enactments were repeated and continued by the Navigation Act (12 Char. II. chap. 18), with the further addition that the master and three-fourths of the mariners should also be British subjects. The object of this act was to encourage British shipping, and was long believed to be wise and salutary. Adam Smith, however, perceived that the act was not favourable to foreign commerce or to opulence, and it was only on the ground that defence was more important than opulence that he said it was 'perhaps the wisest of all the commercial regulations of England.' In 1826 the statute 4 Geo. IV. chap. 41 repealed the Navigation Act, and established a new system of regulations, which were further varied by subsequent statutes, till, under the influence of the free-trade doctrines, new statutes were passed which reversed the ancient policy. It was not, however, till 1854 that the English coasting trade was thrown open to foreign vessels. In the United States the coasting trade is reserved exclusively to American vessels. As regards those laws of navigation which affect the property and management of ships, a complete code of regulations is contained in the Merchant Shipping Acts (q.v.).—On navigation, see GEOGRAPHY, LATITUDE and LONGITUDE, GREAT CIRCLE SAILING, &c.; and the handbooks by Inman, Norie, Merrifield, Rosser, and Raper.

Navigators' Islands. See SAMOA.

Navy. The ancient method of naval warfare consisted in great part in the driving of *beaked* vessels against each other; and therefore skill and celerity in manœuvring, so as to strike the enemy at the greatest disadvantage, were of the utmost importance. The victory thus usually remained with the best sailor. These vessels were propelled by oars, which were arranged in one, two, or three banks, according to size of ship; the oars were manned by men sitting or standing on platforms arranged above each other according to the number of banks; those with three banks of oars were called triremes. The earliest powers having efficient fleets appear to have been the Phœnicians, Carthaginians, Persians, and Greeks; the Greeks had fleets as early as the beginning of the 7th century B.C.—the first sea-fight on record being that between the Corinthians and their colonists of Corcyra, 664 B.C. The earliest great battle in which tactics appear to have distinctly been opposed to superior force, and with success, was that of Salamis (480 B.C.), where Themistocles, taking advantage of the narrows, forced the Persian fleet of Xerxes to combat in such a manner that their line of battle but little exceeded in length the line of the much inferior Athenian fleet. The largest triremes in the Persian fleet were manned by 200 rowers and 30 fighting men; there were 1200 triremes and 3000 smaller vessels, while the Greek fleet consisted of 366 triremes only, with a certain proportion of smaller vessels, yet they succeeded in inflicting a crushing defeat on the Persians. The Peloponnesian war, where 'Greek met Greek,' tended much to develop the art of naval warfare. But the destruction of the Athenian maritime power in the Syracusan expedition of 414 B.C. left Carthage mistress of the Mediterranean. The Roman power, however, gradually asserted itself, and after two centuries became omnipotent by the destruction of Carthage. For several following centuries the only sea-fights were occasioned by the civil wars of the Romans—the greatest that of Actium (q.v.) in 31 B.C. Towards the close of the empire the system of fighting with pointed prows had been discontinued in favour of that which had always co-existed—viz. the running alongside and boarding by armed men, with whom each vessel was crowded. Onagers, ballistæ, &c. were ultimately carried in the ships and used as artillery; but they were little relied on, and it was usual, after a discharge of arrows and javelins, to come to close quarters. A sea-fight was therefore a hand-to-hand struggle on a floating base, in which the vanquished were almost certainly drowned or slain.

The northern invaders of the empire, and subsequently the Moors, seem to have introduced swift-sailing Galleys (q.v.), warring both in small squadrons and singly, and ravaging all civilised coasts for plunder and slaves. This—the break-up of the empire—was the era of piracy, when every nation which had more to win than lose by free-booting sent out its cruisers. Foremost for daring and seamanship were the Norsemen, who penetrated in every direction from the Bosporus to Newfoundland. Combination being the only security against these marauders, the mediæval navies gradually sprang up; the most conspicuous being, in the Mediterranean, those of Venice, Genoa, Pisa, Aragon, the Knights of Malta, and the Turks; and on the Atlantic seaboard, England and France.

Mediæval Navies.—In the Mediterranean, towards the middle of the 16th century, so powerful and so threatening had the Turkish fleet become that, after the Knights Hospitallers had been driven out of Rhodes by the Sultan Solyman I. in the year 1523, a combination of the Christian powers was formed for self-defence; but it was not until the year 1571 that the celebrated battle of Lepanto was fought, which broke temporarily the naval power of the Turks. The Christian fleet was composed of Venetian, Genoese, Spanish, and papal ships, under the command of Don John of Austria, with six Maltese galleys, and mustered over 200 vessels,

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of which six were Venetian galeasses, which were larger and carried a heavier weight of metal than had yet been known in Mediterranean warfare. The ordinary galleys were about 160 feet long, 32 feet wide, and were propelled by some sixty oars; they generally carried a 24-pounder forward and two 8-pounders on the poop. In the galeasses the rowers were covered by a narrow deck on which small guns were mounted. The Turkish fleet consisted of 240 galleys, but they were completely defeated, losing over 224 of their ships, of which 94 were sunk or run aground, and the remainder were captured; 30,000 Turks were slain, and 15,000 Christians serving as galley-slaves in the Ottoman fleet were rescued from captivity. The confederates lost 15 galleys and 8000 men. The Venetian and Maltese fleets subsequently became the great naval powers, although sharing the sovereignty of the Mediterranean with the Turks; but during the close of the 16th and 17th centuries the naval power gradually fell into the hands of the English, French, Dutch, and Spaniards.

Modern Navies.—Dating the modern navies of the world from the 16th century, we find the British navy rising from insignificance by the destruction of the Spanish Armada in 1588, a blow from which Spain only partially recovered, and the weight of which the Dutch, whose naval force had acquired tremendous strength in their struggle for independence, increased by their triumph in 1607, in the Bay of Gibraltar. At this time there was no decisive superiority of the fleet of England over that of France; but each was inferior to the Dutch navy. The Commonwealth and reign of Charles II. were signalised by the struggle for mastery between the English and Dutch, when victory, after many alternations, finally sided with the former. Through the 18th century the English and French were the principal fleets; but Louis XVI. gave a decided superiority to the navy of France, and at the period of the American war the naval power of England was seriously threatened. Spain, Holland, and Russia (now for the first time a naval power) had meanwhile acquired considerable fleets; and the 'armed neutrality' to which the northern powers gave their adherence rendered the British position most critical. However, the slowly roused energy of her government, the invincible courage of her seamen, and the genius of her admirals brought Britain through all her trials. Camperdown broke the Dutch power; many battles weakened the French navy; and at Trafalgar in 1805 it, with the Spanish power, was swept temporarily from the ocean.

The resources of France, however, were so great that in a few years after the signing of peace in 1815 her fleet had again been brought up to its old strength, and it still continues to occupy the second place among the navies of the world. To Napoleon III. belongs the credit of first protecting ships with iron, and *La Gloire*, launched at Toulon in 1859, was the first armoured battleship to be put afloat. Much more uniformity in armament and design is found in the French armoured fleet of the present day than exists in the English. The armour-belt round the water-line of many of their ships is of greater thickness than in corresponding English ships. All the armour is well distributed, the guns are carried high out of the water, and the ships themselves steam well. Many distinguished English naval officers are of opinion that, ship for ship, many of the latest French ships are more than a match for ships of a similar tonnage in the British navy. During the Franco-German war of 1870–71 the French fleet had no opportunities of proving its effectiveness.

Of navies which have sprung recently into existence two deserve special notice, the German and the Italian. The first named may be said to date its birth from the acquisition of Kiel by Prussia after the war with Denmark in 1864; and, although too weak to make any head in the war with France in 1870 against the French fleet, yet since that date so rapidly has the young fleet grown that the German navy will most certainly play an important part in any future European complications. The ships are good, and the officers and men are probably among the most highly trained of any navy in the world.

The Italian navy dates from the absorption of the kingdom of Naples by Sardinia in 1860. Since the disastrous battle of Lissa (1866), each successive Italian government has devoted large sums and much energy towards building up a powerful navy, and Italy may fairly claim now to rank as a first-class naval power, occupying a position next to France (see ITALY). Among the Italian ironclads may be numbered ten of the largest and most powerful battle-ships afloat—viz. the *Dandolo* and *Duilio* and the *Italia* and her seven sisters. All these ships carry four 110-ton guns in their turrets or barbettes, besides a powerful auxiliary armament, while the engines of the five latest of these ships are far more powerful than those of even the most newly-designed English battle-ships, and are calculated to drive them at a speed of 18 knots an hour.

The Austrians, the victors at Lissa, have since 1840 possessed a small, but probably for its size one of the most efficient of the European navies, officers and men being most carefully and thoroughly trained.

The Turkish navy, once the terror of the whole Mediterranean, has now sunk to a low ebb. In 1827 it sustained at the battle of Navarino a crushing defeat, from which it never recovered. At the outbreak of the war with Russia in 1853 a division of the Turkish fleet was completely destroyed by a superior Russian force at Sinope; but as a result of the restrictions imposed on Russia after the Crimean war, and of the energy infused once more into Turkish naval administration by Admiral Hobart Pasha, when war broke out again between Russia and Turkey in 1877 the Russian fleet was effectually paralysed by the superior Turkish forces, which retained command of the Black Sea during the war. Since then, however, no new ships have been built, and in the present state of the finances of the country it is unlikely that the Turkish navy will play any important *rôle* again in the future.

The Russian navy was founded by Peter the Great, but, although it soon became a formidable one, it has never as yet distinguished itself or become an important factor in the numerous wars in which Russia has been engaged. After the battle of Sinope in 1853 the bulk of the Black Sea fleet was sunk by order of Prince Menschikoff, governor of Sebastopol, to block the entrance to the harbour, and the remaining ships were burned when the Russians retreated in September 1855. By the abrogation of the Black Sea portion of the treaty of Vienna in 1871 Russia regained a free hand once more in the Black Sea, and she has for some years been making strenuous efforts to resume her place as a naval power. Several formidable ironclads have been built, while others are in course of construction, as well as several cruisers of the most modern type, and she in her turn is once more mistress of the Black Sea.

Simultaneously with the war which followed the declaration of independence the Americans began to build ships, and during that war and the war of 1812 and 1814 their fleet maintained a glorious although unequal struggle with Great

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Britain. The war of Secession, which broke out in 1860, however, found the United States navy at a low ebb, and although a large number of vessels were built during the ensuing four years, they were mostly gunboats for blockading purposes and monitors for coast and river work. Armour-plated ships played, however, an important *rôle* during the naval operations, and the construction of the original *Monitor* at that time by Captain Ericsson, and the good work she performed, in reality settled the type of the armoured battle-ships of the future. Since the war came to an end in 1866 their navy, however, has been much neglected, but since 1887 great efforts have been made to construct a new fleet of the most modern type, both as regards armoured ships and cruisers. In 1889 and 1890 nine new ships were placed in commission; four, including a monitor, completed; five made ready for being armoured; seven built from the keel up, and five cruisers well advanced.

The accompanying table will give a fair estimate of the comparative strength of the different navies of the world.

The ships are arranged in columns according to their fighting value. All ships in the 1st and 2d classes are modern ships, and many of them quite new. A large proportion of the ships in the 3d class are obsolete, and can hardly be considered effective. All the English battle-ships are of iron, built with double bottoms and watertight compartments; but seventeen of the French are built of wood and armour-plated, and these must soon be withdrawn as non-effective. Coast-defence ships are classed among the battle-ships, according to their size. Belted and armoured cruisers are counted among the 1st class cruisers; of these in 1890 Great Britain possessed twelve against five French (on the stocks) and eight Russian. The new Australian squadron is included among British ships. The heavy guns range from the 9-inch 12-ton gun, throwing a projectile of 250 lb., to the 111-ton gun, with a projectile of 1800 lb. The light guns include the quick-firing 3-pounder guns, but not machine guns. All ships actually on the stocks are included in the above list, but not ships simply proposed to be built.

THE BRITISH NAVY.—Alfred the Great was the founder of the English navy, having perceived the necessity of a fleet to protect the coasts from the swarms of pirates in the northern seas. A slight advantage gained by some ships of his over the Danes in 876 induced him to build long ships and galleys, which, as his countrymen were not competent to manage them, he manned with such piratical foreigners as he could engage. After he had driven out the Danes he applied his talents to improve his ships, and built vessels higher, longer, and swifter than before, some rowing more than thirty pairs of oars. Under his successors the number of vessels increased, and both Edward the Elder and Athelstan fought many naval battles with the Danes. Edgar aspired to be lord of all the northern seas, and had from three to five thousand galleys, which he divided into three fleets, on the western, southern, and eastern coasts respectively. Ethelred II. enacted that every owner of 310 hides of land should build and furnish one vessel for the service of his country. William the Conqueror established the Cinque Ports, and gave them certain privileges, on condition of their furnishing fifty-two ships for fifteen days, carrying twenty-four men each, in case of emergency. Richard I. took one hundred large ships and fifty galleys to Palestine. King John claimed for England the sovereignty of the seas, and required all foreigners to strike to the English flag, an honour which was exacted by the English

CHIEF NAVIES OF THE WORLD, 1890.

Country.	Battle-ships, including those building.			Cruisers, including those building.			Gunboats.			Sloops and Gun-vessels—many obsolete.	Torpedo-depôt Ships.	2d Class and Coast-defence Gunboats, mostly obsolete.	Troop-ships.	Yachts, Despatch, and other Vessels.	Merchant-steamers retained as Aux. Cruisers in War.	Total Ships.	Torpedo Boats.		Guns.		Men.	Annual Cost.	Country.
	1st Class.	2d Class.	3d Class.	Belted Cruisers included in 1st Class.	2d Class.	3d Class.	Torpedo Gunboats.	Gunboats, 1st Class.									1st Class.	2d Class.	12 tons and upwards.	Light Guns under 12 tons.			
Great Britain	30	28	11	23	68	47	82	18		36	2	63	13	70	25	435	100	96	430	3301	94,563	£15,786,000	Great Britain.
France	18	9	26	9	11	44	15	12		12		48	57	39		280	120	48	252	1483	70,560	11,000,000	France.
Italy	11	7	4		14	13	14	11		10	1	28	5	15	8	136	110	21	78	531	23,000	5,100,000	Italy.
Russia	9	5	22	9	2	29	4	25		7		20	7	66	16	221	60	87	124	586	31,000	4,354,389	Russia.
Germany	14	6	14	6	10	15	4	5		7	1	5	2	17		92	113	13	135	473	16,455	4,400,000	Germany.
Austria-Hung.	5	7	3	3	9	14	9			6			4	19		73	62	34	49	260	9,000	1,656,000	Austria-Hung.
Turkey		7	11			7	1	4		11			4	40		101	21	2	54	328	23,000		Turkey.
Spain	1		6			12		8		6		51		10		180	14	2	48	257	16,700	1,980,000	Spain.
Netherlands		2	22	1	8	1	1	7		12		15	1	17		108	12	2	39	217	10,000	1,080,000	Netherlands.
Swed.-Norway		2	18		1	9		12		24		29		19		93	59	20	29	115	7,880	550,000	Swed.-Norway.
Denmark		2				2	1	8			1		1	12		40	14	10	22	180	1,400	226,000	Denmark.
Greece		3	2			4		12		6	1		1	5		51	1	23	8	74	1,100	256,000	Greece.
Portugal		1		1		8		17					1	11		40	24	43	8	96	8,530	260,000	Portugal.
United States	8	1	17	7	5	26	2	11		3		8	3	15		89	6	6	26	258	11,400		United States.
Brazil	2	1	8	1	4	4		9				4		5		42	8	16	28	106			Brazil.
Argent. Confed.	1		3		1		3	3						10		20	13	8	13	23			Argent. Confed.
Chili		1	3	1		8	2	2						7		26	11	4	12	77			Chili.
Japan		1	6		9	11		12		2			2	9		53	24	6	17	193			Japan.
China		2	4		4	12	1	17					13	5		58	22	9	25	108			China.

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admiral from the fleet conveying Philip II. of Spain off Southampton-water, when the latter was on his way to espouse Queen Mary: this honour was formally yielded by the Dutch in 1673 and the French in 1704, but the custom since the peace of 1815 has fallen into disuse. In the year 1293 a great naval action was fought in mid-channel with the French, when the English captured 250 sail; and Edward III. with the Black Prince at the battle of Sluys in 1340 defeated a greatly superior French fleet.

Henry V. had something of a navy; but Henry VII. seems to have been the first king who thought of providing a naval force which might be at all times ready for the service of the state. He built

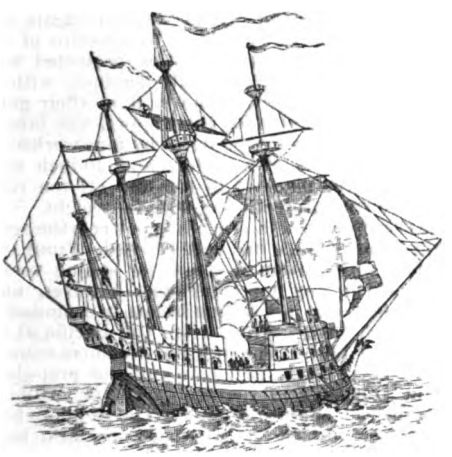

Fig. 1.—The *Great Harry*.

the *Great Harry*, properly speaking the first ship of the royal navy. She cost £15,000, and was accidentally burned in 1553. To Henry VIII., however, belongs the honour of having laid the foundation of the British navy as a distinct service. He constituted the Admiralty and Navy Office, established the Trinity House, and the dockyards of Deptford, Woolwich, and Portsmouth, fixed regular salaries for the admirals, captains, and sailors, and made the sea-service a distinct profession. In 1512, when a fleet was fitted out against France under Sir Edward Howard, Lord High Admiral, the following allowances were made: For his own diet, maintenance, wages, and rewards per diem, 10s.; each captain for his own diet, maintenance, wages, and rewards per diem, 1s. 6d.; every soldier, mariner, and gunner for his wages per lunar month, 5s., and for his victuals, 5s. In 1515 King Henry caused the *Henri Grace-à-Dieu*, of about 1000 tons and carrying 122 guns, to be constructed, in emulation of a somewhat similar ship called the *Caracon*, but only carrying 100 guns, which had lately been built by Francis I. of France. She appears to have been built rather for magnificence than for use; only thirteen of her guns were 9-pounders or upwards, and she is said to have steered badly and rolled heavily. After making one voyage she was disarmed at Bristol and suffered to decay. The French ship was still more unfortunate, being accidentally destroyed by fire at Havre. The ships of this period were high, unwieldy, and narrow, their guns close to the water, and they had lofty poops and forecastles. At the death of Henry VIII. the tonnage of the navy was 12,000 tons; there were some fifty ships manned by 8000 men. Elizabeth increased the fleet greatly. The fleet which met the Spanish Armada numbered 176 ships armed by 14,996 men; but these were not all 'shippes royal,' for she encouraged the merchants to build large ships which were as much fighting ships as traders, and rated at 50 to 100 tons more than they measured. She raised the wages of seamen to 10s. per month. Signals were first used in this reign as means of communication between ships. In the reign of James I. lived the first able and scientific naval architect, Phineas Pett; he introduced a better system of building, and relieved the ships of much of their top-hamper, abolishing the lofty poops and forecastles. In 1610 he laid down the *Prince-Royal*, a two-decker carrying sixty-four guns; and in 1637 from Woolwich he launched the celebrated *Sovereign of the Seas*, the first three-decker and the largest ship hitherto constructed on modern principles. She was 232 feet in length, of 1637 tons, and carried at first 130 pieces of cannon; being found unwieldy, she was cut down, and proved an excellent ship, but was burned in 1696. In this reign the navy was first divided into rates and classes. Cromwell left 154 sail, measuring 57,643 tons, of which one-third were two-deckers. He was the first to lay before parliament annual estimates for the support of the navy, and obtained £400,000 for that purpose. During the Protectorate Peter Pett, son of Phineas, built the *Constant Warwick*, the earliest British frigate, from a French design and pattern. The Duke of York, afterwards James II., assisted by the celebrated Samuel Pepys, as Secretary, did much for the navy. He appointed a new commission when he came to the throne, with which he joined Sir Anthony Deane, the best naval architect of the time, who essentially improved the ships of the line by copying from French models; at this time, and during the 18th century, naval architecture was zealously studied in France, and the English constructors were so sensible of their inferiority that even up to the beginning of the 19th century all our best ships were either captured from the French or copied from them. At the Revolution of 1689 the fleet was in excellent condition, with sea stores complete for eight months for each ship. The force consisted of 184 vessels, carrying 6930 guns, and 42,000 men, whereof nine were first-rates.

William III. added greatly to the navy, which numbered at his death 272 ships of 159,020 tons, the annual charge being £1,056,915. The dockyard at Hamoaze, out of which has since grown the considerable town of Devonport (q.v.), was also established during his reign (see also the article DOCKYARDS, ROYAL).

At the death of Queen Anne in 1714 the number of ships was less, but the tonnage relatively greater, there being 198 ships, carrying 10,600 guns, the tonnage being 156,640. In 1747 a naval uniform was first established. The navy increased rapidly during the reigns of the first two Georges, and at the accession of George III. consisted of 127 ships of the line and 198 of fifty guns and under, measuring 321,104 tons, and manned by 70,000 seamen and marines. The navy was kept in a high state of preparation, and, when in February 1793 the French Republic declared war against England, in a few weeks fifty-four sail of the line and 146 smaller vessels had put to sea completely equipped. The whole fleet in 1793 consisted of 122 ships of the line, 97 frigates, and 102 sloops and smaller vessels, manned by 85,000 seamen and marines. The navy of France had never been so powerful; it amounted to above 200 vessels, of which 82 were of the line, and 71 were in addition ordered to be built. The English had about 115 sail of the line fit for service; but the majority of the French ships were larger and finer and carried heavier guns on their lower or principal battery. The following abstract will

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show the losses on both sides up to the peace of Amiens (1802).

	Captured.	Destroyed.
British ships of the line	5	0
Smaller vessels	37	9
Total	42	9
French ships of the line	32	11
Dutch " "	18	0
Spanish " "	6	5
Danish " "	2	0
Total	58	16
French smaller vessels	266	44
Dutch " "	62	6
Spanish " "	57	10
Grand Total	443	76

This estimate does not include 807 privateers, chiefly French, taken and destroyed. Of the above, 50 sail of the line and 94 under that size were added to the British navy.

During the peace of Amiens preparations for war were actively continued on both sides, and when war broke out again in March 1803 the British fleet consisted of 153 ships of the line and 411 under that size, manned by 120,000 seamen and marines. 'In the year 1809,' to quote the words of Alison, 'the British fleet was at the zenith of its power, and Great Britain first appeared in the field on a scale adequate to her mighty strength. With a fleet of near 1100 vessels, including 240 of the line, manned by 140,000 men, she blockaded every hostile harbour in Europe, and still had 37 ships of the line to strike a blow at the Scheldt. With 100,000 regular troops she maintained her immense colonial empire; with 191,000 more she ruled India; with 400,000 militia she guarded the British Isles; while her fleet could convey yet another 100,000, with which she menaced, at once, Antwerp, Madrid, and Naples; while Lord Minto, the Governor-general of India, announced in his despatches with well-founded pride that "from Cape Comorin to Cape Horn a French flag could nowhere be found flying."'

The following abstract shows the losses on each side from 1803 to the end of the war, during which 33 sail of the line and 68 under were added to the British navy.

	Captured.	Destroyed.
British ships of the line	0	0
" under	83	7
Total	83	7
Enemies' ships of the line	55	14
" under	79	23
Total	134	37

Since the peace in 1815 the number of vessels has been greatly diminished, although their power has vastly increased.

The progressive augmentation of size in vessels may be judged from the increase in first-rates. In 1677 the largest vessel was from 1500 to 1600 tons; by 1720, 1800 tons had been reached; by 1745, 2000 tons; 1808, 2616 tons; 1853, 4000 tons; 1860, 6959 tons—the *Victoria*, the last three-decker built in England; while the *Warrior*, the first ironclad built in Britain, and launched in 1861, is 9210 tons, and in 1890 ironclads were building of 14,000 tons. We may observe by the way that up to the year 1860 the ships were practically the ships of the last two centuries, improved and developed largely certainly by the introduction of steam, of increased tonnage and of better lines, but still the same ships, and in the matter of armament with but little improvement to record over the beginning of the century. In 1786 the *Victory* was launched; she was at that time the largest three-decker in the English service; she is 186 feet long, has a tonnage of 2100 tons, and carried 100 guns, the bulk of which were long 32-pounders, weighing 56 cwt. In 1859 the flagship in the Mediterranean was the screw three-decker, the *Marlborough*; she was 282 feet long, 6100 tons, and carried 121 guns; her lower-deck guns were 65 cwt. 8-inch shell guns throwing a shell with bursting charge inclusive of 56 lb., while her remaining guns were the long 56 cwt. 32-pounders, with which the *Victory* had been armed nearly a century before. But since 1860 a vast revolution has been effected in our naval forces, and it seems almost incredible that in so short a space so great a transformation should have taken place. Masts and sails have disappeared, the wooden walls of old England are things of the past, and, instead of the graceful frigate and stately line-of-battle ship, our battle-ships of the present day are floating castles protected with massive armour, crammed with engines, without which they could neither move, fight their guns, nor be even habitable for their crews, the breathing air below being driven down by fans worked by steam; while the 32-pounders and 10-inch shell guns have given place to 67-ton and 110-ton rifled guns, throwing projectiles of 2000 lb. weight.

The use of steam as a propelling power is the agent by which this change has been effected. From 1841 a gradual substitution of steam for sailing vessels began, which was not completed, however, until 1860—in fact, the last sailing frigate in commission, the *Calypso*, only returned from the Pacific at the latter end of 1861. The first war steamers were all paddle-wheel vessels, and this mode of propulsion brought a change in the armament, or rather in the method of mounting guns. The paddle-wheels being quite exposed, and the machinery also being mostly above the water-line, there was great danger that a lucky shot would soon put a ship out of action, if compelled to fight broadside to broadside, as ships had been accustomed to do formerly. To obviate this danger as far as possible, the few guns these paddle-ships carried were mounted as pivot-guns, by which a far larger arc of training was possible than to a gun mounted on the broadside, thus enabling a ship to fight her guns without exposing her whole broadside to an enemy's fire. A few paddle-frigates, however, of large size, were built, and in their day did good service; of these the well-known *Terrible*, nicknamed during the Russian war of 1854–56 the 'Black-Sea Cat,' was the largest; she was a ship of some 3600 tons, carried sixteen 68-pounders, and had engines of 800 horse-power. At the bombardment of Sebastopol the sailing line-of-battle ships were all towed into their places by the paddle-frigates, which were lashed on their off-sides. But it was the application of the screw as a means of propelling ships which has really revolutionised ships of war. Its vast superiority over the paddle was at once seen, and by the commencement of the Russian war in 1854 many ships of the line, frigates, and smaller vessels had been either converted or built as screw ships. After the conclusion of the war many of the sailing three-deckers were converted into steam two-deckers, being lengthened amidships, and engines being then fitted to them; while during the three and four succeeding years naval architecture seemed to have reached its acme, the line-of-battle ships and frigates which were launched at the time being quite unsurpassed for beauty of their hulls, their size, and their sailing and steaming qualities. Strangely enough, for the first time in history, the new ships at this time were far superior to the French, especially the line-of-battle ships, which all carried their lower deck guns twice as high out of the water as the French ships, and were altogether finer and

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handsomer models. But the knell of wooden ships had already sounded, and many of the finest

Fig. 2.—The *Duke of Wellington* screw line-of-battle ship, 131 guns.

line-of-battle ships built at this time were never even commissioned.

To Napoleon III., emperor of the French, belongs the idea of plating ships with iron. The effect of shells on the ships at the first bombardment of Sebastopol showed clearly that unless some means of protection could be devised ships were placed at a terrible disadvantage when attacking heavy shore batteries. The result was the laying down in France and England in the year 1855 of what were called floating batteries, which were, however, completed too late to take any active part in the war. Some ten were built in England; they were 172 feet long, 43 feet beam, about 2500 tons displacement, a draught of water of 7 feet 9 inches, and had engines of 200 horse-power; they were plated with 4 inches of iron on 20 inches of wood backing; they could only steam about 5 knots, and, as they were flat-bottomed with no keels, were very unmanageable; but they were heavily armed, carrying sixteen 68-pounders in their batteries. Three years later, however, the first ironclad frigate was laid down at Toulon, the celebrated *La Gloire*. She was designed by M. Dupuy-de-Lôme, head of the constructive department of the French admiralty, was built of wood and plated entirely with 4½ inch iron plates to 6 feet below the water-line; she was 250 feet long, 55 feet beam, was built with a ram-bow, and could steam about 13·5 knots. She was launched in the early part of 1860, and in December of that year proceeded on a series of trials in company with the *Algeciras*, one of the fastest French line-of-battle ships. She proved herself a good sea-boat, and under all conditions steamed better than the wooden ships. In England they were not idle, and in January 1861 the *Warrior* was launched from the works of the Thames Shipbuilding Company. Designed by Mr Scott Russell, this ship, which, unlike *La Gloire*, is still fit for service, was built entirely of iron. She is, however, only armour-plated for two-thirds of her length, her bow and stern being unprotected; she is 9210 tons, 420 feet over all, with a beam of 59 feet, and her plating 4½ inches thick; while her engines—5770 indicated horse-power—gave her a speed of nearly 15 knots. She was thus nearly double the size and tonnage of *La Gloire;* but, although still a fine vessel and a beautiful model, she has long been obsolete as a fighting ship. She was quickly followed by others—ships in which the armour was carried completely round the hull; and in order more rapidly to form a large ironclad fleet several of the new line-of-battle ships were cut down, and converted into armoured frigates with ram-bows, and with plating from 4½ to 6 inches in thickness. These ships were, however, only makeshifts, as they had no watertight bulkheads, and the armour soon caused the wooden sides underneath to rot and decay. Still they answered their purpose, and filled a gap until newer and stronger ships, built entirely of iron, could be designed and constructed.

From 1861, when the *Warrior* was launched, up to the present day has been an unceasing era of change in design to meet the ever-increasing requirements of a modern ship of war, brought

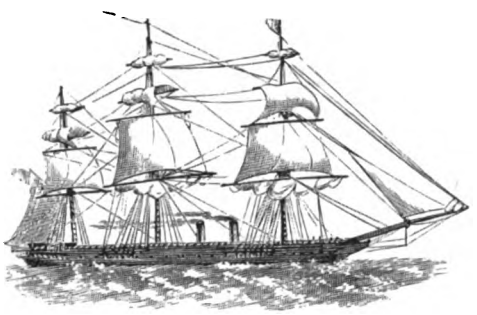

Fig. 3.—The *Warrior* armour-plated screw frigate, 32 guns.

about by the production of guns ever growing in size and power, and the corresponding necessity of increased thickness of armour. In Hampton Roads during the American civil war was fought on the 9th of March 1862 the first naval action between armoured ships, which practically sealed the fate of armoured frigates of the earlier type almost before they had in many cases left the stocks. When Norfolk with its dockyard was evacuated by the Federal troops at the outbreak of the war between the Northern and Southern states, the *Merrimac*, a large 50-gun steam-frigate, was set on fire to prevent her falling into the hands of the Confederates. She was, however, only partly burned, and the Confederates found her in all essential respects uninjured. Remembering the many experiments that had been made in Europe to show the value of iron armour for ships, and painfully conscious of their weakness at sea, they appear to have thought there was one grand opportunity open to them, and to have made use of it with characteristic vigour and skill. They built up over her deck and down upon her sides to below the water-line a shot-proof covering formed of sloping plates of railroad iron, and meeting at the top like the roof of a house, through which came her funnel and the only opening for

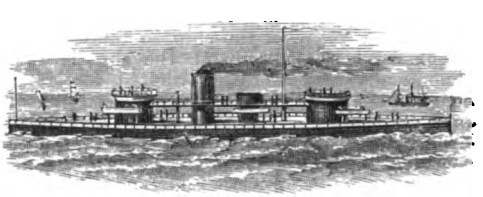

Fig. 4.—American Turret-ship, *Miantonomah*.

ventilation. She was armed with two 100-pounder Armstrong guns and eight 11-inch guns, and on the 8th of March 1862 she steamed out to attack the blockading Federal squadron, consisting of two

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sailing frigates, the *Cumberland* and the *Congress*, and three steam-frigates, which latter, however, were unable to come up in time to take part in the action. The *Cumberland* was sunk and the *Congress* had to surrender, the *Merrimac* herself sustaining no injury, although she sunk the first-named ship by ramming. The next morning she came out to attack the remaining ships, but was met by an antagonist which, although much smaller, proved more than a match for her. This was the celebrated *Monitor*, built and designed by Captain Ericsson (q.v.); and from her have sprung the monster turret-ships of the present day. She was only 210 feet long, with an extreme beam of 45 feet; her deck and low sides were plated, and she carried two 150-pounder Dahlgren guns in a single turret amidships, which was protected with eight 1-inch iron plates screwed together, and was turned by steam; she had no bulwarks, and her deck was barely two feet out of the water, while besides the turret nothing showed on deck except her funnel and an armoured pilot-house at the stern. The result of the fight is well known, and the *Merrimac* had to retreat before her small opponent. Great was the excitement caused when the news of this action reached Europe, and nowhere more than in England, where a demand immediately arose for the conversion of the fleet into turret-ships. Captain Cowper Coles (q.v.) had ever since the Crimean war been urging the Admiralty to build turret-ships in some form or another, but no attention had been

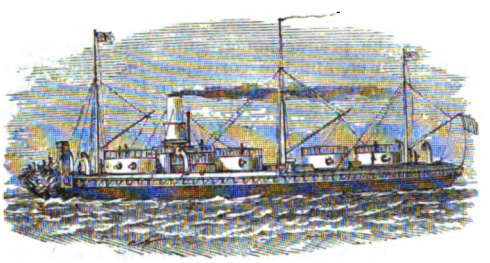

Fig. 5.—Turret-ship, *Royal Sovereign*.

paid to him; he now again came forward with plans for converting some of the wooden ships into *Monitors*, and the Admiralty determined to give his plan a trial. Accordingly a screw three-decker, the *Royal Sovereign*, was cut down, armour plated, and fitted with four turrets, each carrying two 9-ton guns. She had a freeboard of six feet, thus making her a great deal more seaworthy than the American *Monitor*; but, as the ship had not originally been destined for such heavy work, she laboured under some disadvantages. Nevertheless she was considered for a time the most formidable ship in the navy. When once fairly tried the advantages of the turret over the broadside system was evident; the turrets are placed in the centre of the ship, so the weight of the guns and the armour of the ship is more systematically and evenly distributed, and it has become possible to mount the heaviest guns in turrets and barbettes—guns of a size and weight which by no possibility could ever be carried on the broadside. Another advantage which turrets offer is the much greater protection afforded to the guns in them and to their crews, not only from the increased thickness of the armour which can be carried on them, but also from the probability that many projectiles will glance off the rounded surface of the turret instead of penetrating, while, owing to the low freeboard, the mark offered to an enemy is much smaller than in a high freeboard broadside ship. Turret-ships did not, however, immediately supersede broadside ships, and the controversy as to the respective merits of the two systems raged for some time. Guns and armour were in the meantime growing. In 1866 the *Bellerophon* was completed, a fine broadside ship with a 6-inch belt at the water-line and 5-inch over her battery, in which she carried twelve 12-ton guns.

To Rear-Admiral Scott the country is indebted for the iron carriages and slides, with their patent compressors for checking the recoil, which made the mounting of heavy guns on the broadside possible. But now a new danger to be guarded against had arisen in the shape of that dangerous weapon the torpedo. The word was first applied to everything, no matter what its nature, which was exploded under water against ships; but of late years the word torpedo refers solely to mobile under-water weapons of offence, and more particularly to the fish or Whitehead torpedo, whilst the fixed or stationary torpedoes are now called submarine mines (see TORPEDOES and MINES). To afford as much protection as possible from these enemies, and also to make a ship as unsinkable as possible, not only has a system of building ships with an inner as well as an outer bottom been adopted, but by means of transverse and other bulkheads the whole hull below the water-line is subdivided into a number of watertight compartments, so that if a ship is injured the damage and water admitted is confined to as small a section as possible. Two complete sets of engines, driving each a separate screw, also took the place of the old single screw. This not only gives ships greater turning powers, but if one engine is disabled they are not left quite helpless. In 1869 three large low freeboard mastless turret-ships were laid down, the *Devastation*, *Thunderer*, and *Dreadnought*; the first-named ship was commissioned at the end of 1872, and they have all done good service, and still remain amongst our most formidable ships. They are protected by a belt of 14-inch armour at the water-line; above

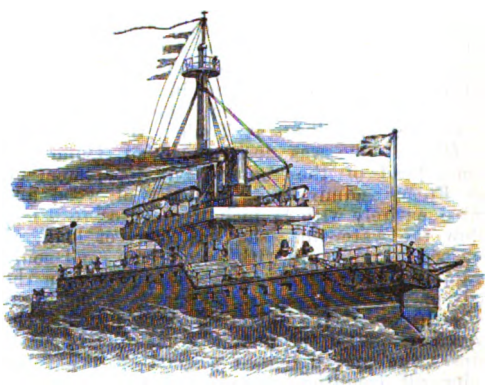

Fig. 6.—The *Devastation*.

this, running about two-thirds of the length of the ship, is an armoured breastwork with 12-inch armour which protects the base of the turrets, loading-gear, &c. An armoured deck resting on the top of the belt covers in the whole ship outside the casement, the turrets being placed at each end of this breastwork. The freeboard fore and aft of these ships is extremely low, the deck being barely four feet out of the water, thus necessitating at sea the closing of all apertures by watertight hatches, as the deck is continually under water. A superstructure or hurricane deck is erected in the space between and slightly above the turrets, where

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accommodation is found for the boats, chart-house, and armoured conning-tower; the funnels, ventilators, and means of communication with the interior of the ship when the hatches on the upper deck are closed, all lead up through this structure, which is sufficiently spacious to form a small promenade in bad weather. These ships and others of the same type are ventilated below by means of air which is driven down by fans worked by steam. They have only what is called a military mast, the principle use of which is to serve as a support for the derrick used to hoist out the large boats. The original armament of these ships

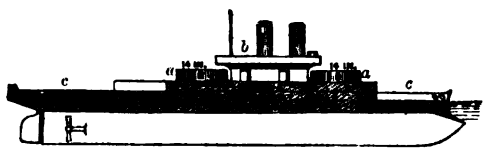

Fig. 7.—Diagram showing Disposition of Armour in H.M.S. *Devastation* (1872), twin-screw double-turret battle-ship, 1st class, four 29-ton guns in pairs in turrets. 9330 tons, 7000 H.P.

a, *a*, turrets; *b*, superstructure; *c*, upper deck.

consisted of four 35-ton muzzle-loading guns, but since 1890 they have been supplied with 29-ton breech-loading guns of the most modern type, and a full complement of 3- and 6-pounder quick-firing guns, which are mounted on the superstructure. The introduction of this new type of sea-going turret-ship was a bold experiment and the occasion of much controversy; but even in the first venture a large measure of success was achieved. Deficiency of freeboard forward is the fault of the *Devastation* and her sisters, as also of many of the later ships, for with such a form of bow it is difficult, if not impracticable, to maintain a high rate of steaming against a heavy sea. Of course, the object of the bows being kept so low is to offer a smaller target to the enemy and to enable the guns mounted in the fore-turret to command an all-round fire.

Captain Coles was not satisfied with the *Royal Sovereign* or the turret-ships subsequently designed. He believed he could build a turret-ship which, with a low freeboard, should yet be heavily masted and able to keep the sea under sail alone; so the *Captain*, a large ship of over 6000 tons, was built from his designs with a freeboard of only 6 feet; she was heavily masted so as to give her great sail-power; her design was not approved at the Admiralty, her freeboard for a masted-ship being considered dangerously low. So the *Monarch*, a turret-ship of about the same tonnage, but with a freeboard of 14 feet, was built at the same time, embodying the Admiralty idea of what a masted turret-ship ought to be. Both ships carried four 25-ton guns in their turrets. The fate of the unfortunate *Captain* is well known. About an hour after midnight on the morning of the 6th of September 1870, while cruising with the Channel Squadron off Cape Finisterre, she was capsized when under sail in a heavy squall, and went down immediately; 500 officers and men, among whom were her captain, Captain Burgoyne, V.C., and Captain Coles himself, were lost. The *Monarch*, on the other hand, has been continually in commission, and in 1890 was re-engined and provided with new breech-loading guns. After the completion of the *Bellerophon* in 1866 an entire change was made in the arrangement of the guns in the batteries and in the disposition of the armour-plating in the new broadside ships which followed her. The *Bellerophon*, like her predecessors, was armoured all over, the plating extending some 5 feet below the water-line, while her guns extended along the maindeck as in the old wooden ships. An attempt was now to be made, without materially increasing the size of the ships, to carry yet heavier guns and protect them with thicker plating; at the same time various devices were resorted to to try and combine some of the advantages of the turret-ship with the broadside system of mounting guns, by giving an end-on fire to bow and quarter guns and generally increasing the arc of training.

The result was what are now known as central-battery ships, of which the *Hercules*, *Sultan*, *Téméraire*, and *Alexandra* are very fine specimens. These ships have a complete belt of armour round the water-line tapering from 12 inches to 5 inches in thickness. The armour is carried up over the central portion of the ship and the batteries; athwartship armour bulkheads shut in the batteries fore and aft, forming a complete armoured citadel; before and abaft these bulkheads, above the armour-belt, the sides are unprotected in any way, and here are the quarters for the officers and men. The guns are carried in the batteries, there being an upper and a lower one, the lower being the main or principal battery; the foremost and after ports are recessed so as to give a nearly end-on fire, while in some cases the upper battery is made to overhang, the ship's side being made to fall in, and thus a direct bow and stern fire is obtained. Both the *Alexandra* and *Téméraire*

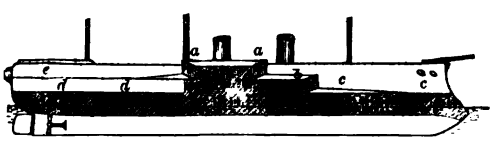

Fig. 8.—Diagram showing Disposition of Armour in H.M.S. *Alexandra* (1875), twin-screw central-battery broadside battle-ship, 1st class. 9490 tons, 8610 H.P., 18 guns.

a, upper battery, two 25-ton and two 18-ton guns; *b*, main battery, two 25-ton and six 18-ton guns, six 6-inch guns on upper deck; *c*, men's quarters; *d*, officers' quarters; *e*, poop.

carry 25-ton and 18-ton guns in their batteries; these ships were launched in 1875, and were the last broadside ships to be built, as they are the finest. After the loss of the *Captain*, and in view of the rapidly increasing competition between guns and armour for the mastery, as illustrated by the fact that in ten years progress had been made from 4½ to 14 inch armour, and from 68-pounders to 35-ton guns, the Admiralty appointed a committee of naval officers and architects to consider and report on the best design for the battle-ship of the future. The result of their deliberations was the adoption of what is known as the citadel type of ship, and on this principle, with certain modifications, several battle-ships were built.

In this type of ship the continuous armour-belt round the water-line is done away with, and in its place the armour of great thickness is concentrated round a citadel in the central portion of the ship; the length of the citadel varies from about one-third the length of the ship to nearly a half; the armour extends to a depth of some 5 feet below the water and about 6 feet above; at each extremity rise the turrets in which the guns are mounted. In the *Inflexible*, the first ship of this type built, the armour at the water-line is 24 inches thick, with 17 inches on the turrets; the plates, however, are of iron, while in the later ships they are compound—iron faced with steel. The *Inflexible* carries two 81-ton muzzle-loading guns in each of her turrets, capable of throwing a projectile of 1750 lb. weight a distance of 6½ miles, with an initial velocity of 1800 feet. From the base of

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the citadel fore and aft extends the whole remaining length of the ship a watertight turtle-backed armoured deck, from 2½ to 3 inches thick; and below this deck, which is below the water-line and within the citadel, are contained all the vitals of the ship—engines, boilers, magazines, &c.—the only communication from above being down through the citadel. The quarters for the officers and men

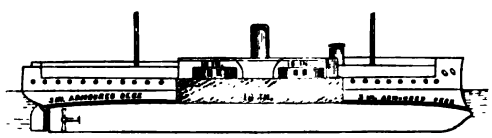

Fig. 9.—Diagram showing Disposition of Armour and Armoured Deck in H.M.S. *Colossus* (1882), improved *Inflexible* type, twin-screw double-turret citadel battleship, 1st class, with unarmoured end but armoured deck. 9420 tons, 7500 H.P., four 47-ton guns, two in each turret; five 6-inch guns on superstructure.

are mostly provided for in those parts of the ship before and abaft the citadel, and are built up above the armoured deck; the idea being that these unarmoured ends might be destroyed by the enemy's fire, but that the body of the ship would remain intact; the citadel, in fact, resting on an unsinkable inner ship below the surface of the water, there being as many as two hundred different watertight compartments in some of the latest battle-ships, including the compartments of the double bottom.

Since the year 1880 another revolution has been carried out, this time in the armament of ships, steel breech-loading guns being now substituted for the old muzzle-loaders. This change was rendered necessary in order to obtain the increased velocity requisite to penetrate the thicker armour now in use. It was found that the necessary length to obtain this increased velocity could not be given to guns which were loaded at the muzzle, so the authorities found themselves compelled to re-arm our whole fleet anew. The work is not yet completed, but since 1882 all the new battle-ships and cruisers have received the new guns. The introduction of fast-steaming torpedo boats has also rendered it necessary for the heavy armament of battle-ships to be supplemented by a large number of light guns; and to the necessity of meeting the attacks of these swift little vessels, we are indebted for all the rapid-firing guns now in use, of which every ship carries a large complement. It thus again became necessary to carry guns on the broadside, and the design of the citadel ships had to be materially modified. Six battle-ships were laid down, known as the Admiral class,

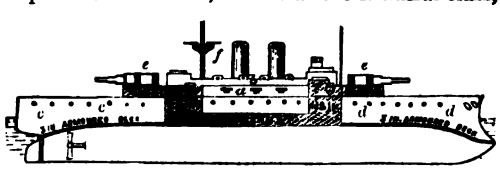

Fig. 10.—Diagram showing Disposition of Armour in the Admiral class, H.M.S. *Rodney* (1885), twin-screw barbette battle-ship, 1st class. 10,300 tons, 11,500 H.P., four 67-ton guns mounted in pairs in the barbettes (*e*); six 6-inch guns in central unarmoured battery (*a*).
b, spar-deck with quick-firing guns; *c*, officers' quarters; *d*, men's quarters; *f*, fighting top, armed with two 6-pd. q.-f. guns.

being named after distinguished naval commanders. Much controversy has arisen over these ships, and it is certain that they are deficient in armour-protection; on the other hand, their armament is a formidable one; they carry four 67-ton guns mounted in pairs, *en barbette*, in fixed heavily-armoured redoubts instead of in turrets. These barbettes are carried at a considerable height above the armoured portion of the hull, and all the hydraulic loading arrangements are protected by them. The ammunition is also brought up from below through armoured tubes. A belt of 18 inches of compound armour protects about 156 feet of the water-line of the ship amidships, and there is in addition a 3-inch steel-armoured deck. Between the barbettes is a long central battery, in which are carried the ten 6-inch guns forming the auxiliary battery, while on the spar-deck above are mounted a due proportion of 3- and 6-pounder quick-firing guns. The advantages claimed for the barbette system, which is in general use by the French, over the turret, is that the guns are carried much higher out of the water; on the other hand, they are much more liable to injury from an enemy's fire, as, except when loading, the whole gun is completely exposed; while the absence of broadside armour for the central secondary battery is a serious defect, leaving the crews, as it does, exposed to destruction by shells charged with melinite or other high explosives, and the hail of fire from the quick-firing guns. These ships are also too low forward, and, although fast ships, they cannot steam at any speed against a heavy head sea.

As the outcome of the popular revulsion against the Admiral type of battle-ship, in consequence of the small amount of armour-protection, and in view of the development of high explosives for use in shells, and the rapid growth in the size of the quick-firing guns, the *Nile* and *Trafalgar* were laid down in the year 1885. For their offensive powers and for

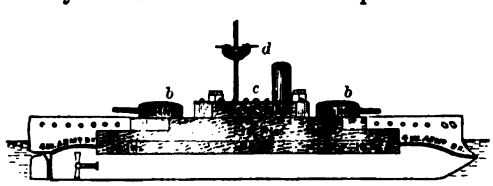

Fig. 11.—Diagram showing Disposition of Armour in H.M.S. *Trafalgar* (1888), twin-screw double-turret battle-ship, 1st class, with armoured central battery. 11,940 tons, 12,000 H.P., four 67-ton guns in turret (*b*); eight 40-pounder quick-firing guns in central battery (*a*); twelve 6-pounder quick-firing guns on spar-deck (*c*); fighting top with two 6-pd. q.-f. guns (*d*).

the completeness of their armour-protection, as compared with any former ships, they are quite unquestionably the two most formidable battle-ships at present afloat. Although not completely belted all round, they are very nearly so, and may be described as improved *Devastations*, with the addition of a central battery between the turrets for the auxiliary armament, in place of the superstructure of the earlier ships. The main armament consists of four 67-ton guns, while the auxiliary armament consists of eight 4·7-inch 40-pounder quick-firing guns, which are protected by 5-inch steel armour; and in addition they carry sixteen 3-pounder and 6-pounder quick-firing guns, mostly mounted on the spar-deck. In 1889 what is known as the Naval Defence Act was passed, which authorised the construction of ten new battle-ships, forty 1st and 2d class cruisers, and twenty torpedo gunboats. The battle-ships are to be 14,000 tons displacement, with a length of 380 feet, and a beam of 75 feet; their engines of 13,000 horse-power are to drive them at a speed of 18 knots, which is a knot faster than that obtained from the *Nile* and *Trafalgar*. The disposition of the armour is much the same as in the two former ships, and the armour is of the same thickness except at the water-line, where it is two inches less; this water-line belt is

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8½ feet broad, extending three-fourths the length of the ship, with a maximum thickness of 18 inches; the belt is terminated by transverse armoured bulkheads; above it is a 3-inch steel deck, while a strong under-water deck completes the protection before and abaft the belt. The broadside above the belt is protected to a height of 9½ feet above water over a considerable portion of the length by 5-inch armour, screen bulkheads similarly armoured enclosing the central battery. The armour on the barbettes is 17 inches thick, while the protection of the guns and crews of the auxiliary armament has been carefully arranged in view of the development of high explosives and quick-firing guns. In eight of these ships the main armament of 13½-inch 67-ton guns is carried in barbettes 23 feet above the water; in the remaining two they are mounted in turrets. The auxiliary armament consists of ten 6-inch 5-ton 100-pounder quick-firing guns, sixteen 16-pounder, and eight 3-pounder quick-firers, together with seven torpedo-tubes, of which two are submerged.

Since 1880 a large number of fast cruisers have been built. Of these ten are protected by a belt of 10-inch steel armour two-thirds of the length of the ship at the water-line, as well as by an armoured deck; all the remainder are known as 'protected cruisers'—i.e. they have an armoured turtle-backed deck which extends throughout the length of the ship; the thickness varies in the different ships from 6 inches on the slope to 2 inches on the horizontal part. The top of the deck rises to a maximum of about 18 inches above the water-line, but on the side it curves down to join the plating of the skin 6½ feet below the water. In the new cruisers, round the hatchways, funnel casings, &c. protection is given by 5-inch steel armour, while the guns also are protected by casemates plated with 4-inch steel armour, and the ammunition is passed up from the magazines to the guns through armoured tubes. The speed of these ships varies from about 16 knots in the cruisers of 1880 to 19 knots in the more recent ones, and two first-class cruisers, the *Blake* and *Blenheim*, are intended to steam 22 knots. As in the battle-ships, so in the modern cruisers

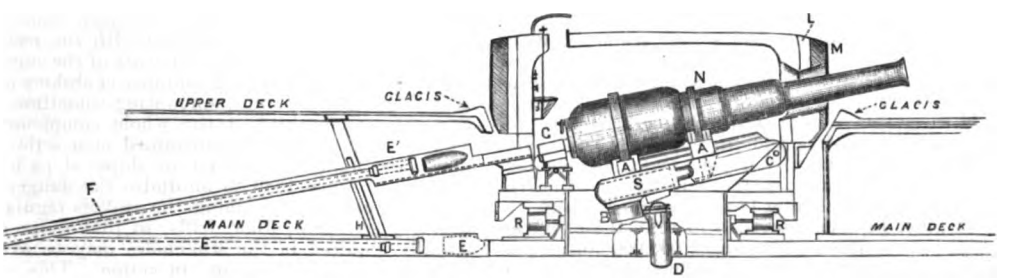

Fig. 12.—Section of Turret, showing System of Mounting Heavy Guns, and Hydraulic Arrangement for Loading.—H.M.S. *Colossus.*

A, saddle on which the gun is fixed; B, recoil press; S, slide; C, pivot of slide; D, elevating cylinder; E, loading trough; F, rammer; G, hydraulic arrangement for working breech-block; H, ram for raising rammer and shot; L, teak backing; M, 18-inch armour; N, the gun (47-ton breech-loader).

The projectile is placed in a trough (E) on the deck; the trough is raised by a ram (H) until it is in the required position (E') for loading; a rammer (F) then passing up the trough forces the projectile into the gun; on the trough being lowered, the cartridge is placed in it and rammed home in a similar manner.

masts and sails have been done away with; and while the battle-ships have what is called a military mast fitted with two armoured tops in which are carried one or more quick-firing guns, the cruisers have only a couple of light poles for signalling purposes. The armament of the cruisers consists generally of two 9-inch 22-ton guns as bow- and stern-chasers, and a proportion of 6-inch or 5-inch guns, according to the size of the ship, with a due complement of quick-firing guns and four or six tubes for discharging Whitehead torpedoes. In these ships which have no vertical armour a certain amount of protection is afforded by the stowage of coal in bunkers above the water-line. Battle-ships and cruisers alike are now lit by electricity, by means of which also the guns are fired and torpedoes discharged; they are also provided with powerful electric search-lights, which will illumine the sea for some 2 miles, while night-signalling is now carried on also by electric light. As a further defence against torpedoes, all large ships are provided with torpedo-nets, which are made of steel wire, with meshes of about 3 inches in diameter, and are rigged out all round the ship by means of booms, which project about 30 feet from the ship's side a little above the water-line; these nets are about 18 feet deep, and when not required for use are stowed inboard.

Ships are further provided with countermines for the purpose of destroying mine-fields defending hostile harbours. See TORPEDOES, MINES.

In England iron plates faced with steel (called compound plates) have been definitively adopted for heavy armour; while steel plates, from 6 inches to 2 inches in thickness, are used for the armoured decks and the shields for the protection of the light guns; and mild steel is now used instead of iron for the hulls of all ships.

The heaviest guns in use in the royal navy are the 111-ton breech-loaders, which throw a projectile of 1800 lb., with an initial velocity of 2300 feet, from 10 to 11 miles. The charge for this gun is 900 lb. of brown prismatic powder. These guns are only mounted in three ships, the *Victoria* and *Sanspareil*, in which they are mounted in pairs in a single turret forward, and the *Benbow*, which has one mounted in each of her barbettes forward and aft. No more guns of this weight are likely to be mounted on board ship, at least in the English navy, and there is a considerable weight of opinion among naval officers that a 12-inch gun of modern design and about 50 tons in weight would possess sufficient power for most purposes; but, as the 67-ton gun has proved most successful, it was finally adopted in 1889 as the heavy gun for the new battle-ships. The cost of the 110-ton gun is £19,600; of the 67-ton gun, £13,600; of the 22-ton gun, £4816; while a 5-inch 36-cwt. gun costs £568.

In considering the question of guns it is essential to keep in view that the endurance diminishes as the calibre increases; the life of the 111-ton gun is considered to be 95 rounds; that of the 67-ton gun, 127 rounds; and that of the 45-ton gun, 150 rounds. The 67-ton gun throws a projectile of 1250 lb., with a charge of 630 lb. of brown prismatic powder, a distance of 10 miles, and will pierce 30 inches of

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armour; but experience shows that armour of this weight cannot be carried on ships of anything like a reasonable size.

Among the lighter ordnance a state of transition exists, due to the unexpected development in what are called quick-firing guns. In the smaller types of these guns the projectile and charge are made up in one cartridge, and by an ingenious arrangement of the breech it can be opened and closed by one man almost instantaneously. The first quick-firing guns were the 3-pounders and 6-pounders invented by Mr Nordenfelt and Mr Hotchkiss: these guns can fire as many as twenty-eight rounds a minute. Since then a 40-pounder quick-firer has been made at Elswick, and has proved most successful. A 100-pounder gun of the same kind is likely to take the place of the 6-inch breech-loader, which also throws a projectile weighing 100 lb. Eighteen rounds in a minute were fired from a 40-pounder quick-firer; and these guns will render an attack by torpedo boats now a very hazardous undertaking (see CANNON, MACHINE GUN). A certain amount of finality would also seem at last to have been arrived at in ships, after thirty years of transition; 18-inch compound or steel plates seem to suffice for all the ordinary protection required, except at very close range from very heavy guns; and ships of 14,000 tons—the size of the new battle-ships—will carry this armour with ease, sufficient to protect their water-line and turrets or barbettes, and will also carry the 67-ton guns and a due complement of smaller ones; while their engines will drive them at a speed of from 16 to 17 knots an hour.

It must be remembered also that these battle-ships now represent a sum of £1,000,000 apiece, and many high authorities seem to incline the scale in favour of types of a less exaggerated cost. Whatever the type, there remains under all circumstances a conspicuous advantage in numbers, and while other nations build these huge ships it unfortunately behoves England to build in return a still larger number. The present classification of ships in the British navy is as follows: Battle-ships, 1st, 2d, and 3d class; belted cruisers, 1st class; protected cruisers, 1st, 2d, and 3d class; sloops; torpedo gunboats; gunboats; torpedo boats; yachts and despatch vessels.

The number of officers and men voted for 1890–91 was 94,563, including 14,000 marines; the amount voted for the same period for the naval service was £16,975,000, of which the principal charges were cost of *personnel* of the fleet, £6,407,408; shipbuilding and repairs, £5,988,232; armament, £1,504,108; victualling and clothing, £1,213,061; and minor votes absorb the remainder. The annual charge in 1880–81 was £10,492,935; of which the cost of *personnel* of fleet was £3,735,038; shipbuilding, &c., £1,780,000; dock and victualling yards, £1,414,745.

In conclusion, it may be interesting to compare the complements of the officers and men of modern battle-ships with those of ships of the line immediately previous to the introduction of ironclads. The flagship in the Mediterranean in 1861 was the screw three-decker *Marlborough*, of 121 guns, and with a crew of 1200 officers and men; she carried a captain, commander, 10 lieutenants, 1 master for navigating duties, 1 paymaster, 2 assistant-paymasters, 3 surgeons, 4 marine officers, 1 chaplain, 1 naval instructor, 1 chief-engineer, 4 assistant-engineers, 4 sub-lieutenants, 24 midshipmen and naval cadets, and 3 warrant officers, besides the vice-admiral commanding and his staff; while the ship's company was composed approximately of 75 petty officers and leading seamen, some 850 seamen and boys, 120 marines, 50 stokers, 30 bandsmen, and the remainder domestics and other non-combatants. The officers and crew of a line-of-battle ship averaged as a rule from 800 to 950; of a frigate, from 400 to 600; and smaller ships in proportion. A modern battle-ship of the *Colossus* type has a complement of 450 officers and men; a barbette ship of the *Rodney* class, one of 560; and a broadside ship of the *Alexandra* type, one of 750. The first-class battle-ship *Victoria*, commissioned in 1890 as flagship in the Mediterranean, has a complement of 600 officers and men, the numbers and ratings being approximately as follows: the vice-admiral and his staff, consisting of his flag-lieutenant, secretary, and 4 secretary's clerks; a captain, commander, staff-commander (for navigating duties), 6 lieutenants, 2 sub-lieutenants, 13 midshipmen, 7 warrant officers, 3 marine officers, a chaplain and naval instructor, 3 surgeons, a paymaster, a chief-engineer, and 5 assistant-engineers. The ship's company is composed approximately of some 40 chief, 1st, and 2d class petty officers and leading seamen, 260 seamen and boys, 90 marines, 15 engine-room artificers, and 120 stokers, the remainder bandsmen and other non-combatants. Not only are the complements of modern ships much smaller than in the old ships, but the proportion of trained seamen is also much smaller in comparison with the rest of the crew. This is due to the increase of the engine-room staffs, and to the large number of stokers now carried in the new ships, amounting sometimes to as many as one-third of the whole complement. As this large number of untrained men seriously affects the fighting efficiency of ships, steps have been taken since 1889 to minimise the danger as much as possible by training the stokers regularly at heavy gun and other drills, so that those not actually required in the stokeholes may be available for use as combatants in action. This step has been rendered the more necessary, as all foreign men-of-war are far more heavily manned than English ships of a similar size. By the Naval Defence Act of 1889, and in the Estimates of 1891, provision is made to carry into effect a large increase of the *personnel* of the navy.

See Derrick, *The British Navy* (1806); W. James, *Naval History of Great Britain* (3d ed. 6 vols. 1847); J. W. King, *War Ships and Navies of the World* (1880); Lieut. F. H. Vesy, U.S.N., *Navies of the World* (1880); W. F. Mitchell, *The Ships of the Royal Navy* (1881); Lord Brassey, *The British Navy* (5 vols. 1882–83), and his *Navy Annual;* Durassier's *Aide-Mémoire de la Marine;* the works of Guerin and Jurien de la Gravière; and German works by Brommy-Littrow (1878), Pavel (1881), and Werner (1884). For the Royal Naval College, see GREENWICH; see also TRAINING-SHIPS, TACTICS, CADET, MARINES, NAVAL RESERVE, ENGINEERS, MACHINE GUN, &c., the articles on ADMIRAL, CAPTAIN, and other naval officers in this work, and those on the great naval commanders, BLAKE, NELSON, &c.

NAVY AGENT, a banker and attorney for naval officers, who bears some such relation to Admiralty expenditure as the Army Agent (q.v.) to War Office expenditure. By the Act of 1865, each of Her Majesty's ships of war, while in commission, has an agent appointed by the commander, and registered. His duties are to act for the ship in cases of salvage, merchant shipping law, distribution of prize-money, capture of slave-ships, &c. He receives 2½ per cent. as payment in full of his services. See the *Navy List*.

Nawanagar, a seaport of India, and capital of a native state (area, 1379 sq. m.; pop. 316,147), stands on the south shore of the Gulf of Cutch, 310 miles NW. of Bombay. Pop. (1881) 39,668.

Naworth Castle. See LANERCOST.

Naxos, the largest, most beautiful, and most fertile of the Cyclades, is situated in the Ægean, midway between the coasts of Greece and Asia

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Minor. It is 20 miles in length, and has a pop. of 14,880. The shores are steep, and the island is traversed by a ridge of mountains, which rise in the highest summit, Dia, to 3289 feet. The wine of Naxos was famous in ancient as it is in modern times, and on this account the island was celebrated in the legends of Dionysus, and especially in those relating to Ariadne (q.v.). It was ravaged by the Persians, 490 B.C., and after the conquest of Constantinople by the Latins became the seat of a dukedom founded by the Venetians. It was Turkish from 1566 till Greece became a kingdom. Naxos, the capital (pop. 2000), is the seat of a Greek bishop and a Latin archbishop. See Tozer's *Islands of the Ægean* (1890).

Nazarenes. See EBIONITES.

Nazareth, the home of Jesus, anciently in the district of Galilee, 21 miles SE. of Acre, is still a small but flourishing town of Palestine. It lies in a hilly tract of country, and is built partly on the sides of some rocky ridges. In the earliest ages of Christianity Nazareth (which is not mentioned in the Old Testament) was quite overlooked by the church; the first Christian pilgrimage to it took place in the 6th century. The principal building is the Latin convent, on the supposed scene of the Annunciation; but the Greeks have also erected on another spot a church in commemoration. The traveller is also shown a Latin chapel, affirmed to be built over the 'workshop of Joseph;' the chapel of 'the Table of Christ' (*Mensa Christi*), a vaulted chamber, containing the veritable table at which our Lord and his disciples ate; and the synagogue out of which he was thrust by his townsmen. The Virgin's Well is just outside the town. The women of the village have long been famous for their beauty. Major Conder says they are more Italian than Arab in feature, and suggests that the blue eyes seen in Syria may be due to an admixture of European blood. The population has been estimated at from 4000 to 10,000. There is here a Protestant mission and orphanage.

Nazarites (properly *Nazirites*, from Heb. *nazar*, 'to separate'), men or women among the Jews who had consecrated themselves to God by certain acts of abstinence, as refraining from using wine, from shaving their heads, as well as from the defilement of contact with the dead. The law in regard to them is laid down in the Book of Numbers (vi. 1–21). The usual term of the vow was thirty days, but examples of vows for life were the cases of Samson, Samuel, and John the Baptist.

Nazianzen. See GREGORY.

Neagh, LOUGH, the largest lake of the British Islands, is situated in the province of Ulster, Ireland, and is surrounded by the counties of Armagh, Tyrone, Londonderry, Antrim, and Down. It is 16 miles in length and 10 miles in average breadth, contains 98,255 acres, is 102 feet in greatest depth, and is 48 feet above sea-level. It receives the waters of numerous streams, of which the principal are the Upper Bann, the Blackwater, and the Callan; and its surplus waters are carried off northward to the North Channel by the Lower Bann. Communication by means of canals subsists between the Lough and Belfast, Newry, and the Tyrone coalfield. The southern shores of the Lough are low and marshy, and dreary in appearance. It is well stocked with fish—lake trout, char, and pullen.

Neal, DANIEL, author of the *History of the Puritans*, was born in London, December 14, 1678. He was educated first at Merchant Taylors' School, and afterwards at Utrecht and Leyden, and in 1706 became minister of an Independent congregation in Aldersgate Street, London. His first work was a *History of New England* (1720), which met with a very favourable reception in America. But his reputation rests on his laborious and accurate *History of the Puritans* (4 vols. 1732–38; new ed., with Life by Joseph Toulmin, Bath, 1793). Neal died at Bath, April 4, 1743.

Neal, JOHN, American author, was born at Falmouth (now Portland, Maine), August 25, 1793. In his youth he was a Quaker, and he began the world at twelve as a shop-boy. In 1816 he failed in business, and turned to the study of law, supporting himself the while by his pen. He was one of the first Americans to write in the greater English magazines, and from 1823 till 1827 he lived in England, part of the time as one of Bentham's students and secretaries. After his return to America he settled in his native town, practised law, edited newspapers, lectured, and found relaxation in practising and teaching boxing, fencing, and gymnastics. He died 21st June 1876. Among his numerous works are a series of novels, *Bentham's Morals and Legislation*, and *Wandering Recollections of a Somewhat Busy Life* (1869).

Neale, JOHN MASON, hymnologist, born in London, January 24, 1818, was educated at Trinity College, Cambridge, became incumbent of Crawley, Sussex, in 1842, and in May 1846 warden of Sackville College, East Grinstead, where he died, August 6, 1866. He belonged to the most advanced section of the High Church party, and was long one of the most misunderstood and unpopular men in England. He was inhibited by his bishop for fourteen years, and burned in effigy in 1857, while throughout life his means were of the smallest. He founded in 1854 the well-known sisterhood of St Margaret. His most important work is his *History of the Holy Eastern Church* (4 vols. 1847–51); others were *Mediæval Preachers* (1857), *History of the so-called 'Jansenist' Church of Holland* (1858), a preposterous adaptation of *The Pilgrims' Progress* (1853), and a long series of stories for the young, intended to popularise church history, but the value of which is almost exclusively other than historical. But his greatest work was his invaluable contribution to hymnology, both original and translated. His *Hymns for the Sick* and *Hymns for Children* were followed by his more important volumes of translations: *Mediæval Hymns and Sequences* (1851), the *Rhythm of Bernard of Morlaix* (1858), and his *Hymns of the Eastern Church* (1863). Many of his translations are cherished by all English-speaking Christendom, as the beautiful hymns, 'O love how deep, how broad,' 'The day is past and over;' and the exquisite series adapted from his translation of Bernard of Morlaix's poem, 'The world is very evil,' 'Brief life is here our portion,' 'For thee, O dear, dear country,' and 'Jerusalem the golden.' There is no modern author to whom hymnology owes a greater debt than to this one inspired writer whose own conscious ecclesiastical sympathies were yet so narrow. A selection from his writings appeared in 1884. See HYMN.

Neander, JOHANN AUGUST WILHELM, the greatest of church historians, was born at Göttingen, 17th January 1789, of Jewish parentage. His name prior to baptism was David Mendel, and by the mother's side he was related to the philosopher Mendelssohn. He received his early education at the Johanneum in Hamburg, and had for companions Varnhagen von Ense and Chamisso the poet. Even while he was a boy, Plato and Plutarch were his favourite books, and he was profoundly stirred by Schleiermacher's famous *Reden über die Religion* (1799). Finally in 1806 he publicly renounced Judaism, and was baptised, adopting the name of Neander ('new man'), and taking his Christian names from several of his friends. His sisters and brothers, and later his mother also,

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followed his example. He now proceeded to Halle, where he studied theology under Schleiermacher, and concluded his academic course at Göttingen. In 1811 he took up his residence at Heidelberg as a *privat-docent;* in 1812 he was appointed there extra-ordinary professor of Theology; and in the following year he was called to the newly-established university of Berlin as professor of Church History. Here he laboured till his death, July 14, 1850. Students flocked to him not only from all parts of Germany, but from the most distant Protestant countries. And his sweetness of character was no less attractive than his genius. Profoundly devotional, sympathetic, glad-hearted, profusely benevolent, and without a shadow of selfishness, he inspired universal reverence, and was himself by the simplicity and sanctity of his life a more powerful argument on behalf of Christianity than even his writings. He used to give the poorer students free admission to his lectures, and to supply them with clothes and money. The greater portion of what he made by his books he bestowed upon missionary, Bible, and other societies, and upon hospitals.

Neander is believed to have contributed more than any other single Christian scholar to the overthrow, on the one side, of that anti-historical Rationalism, and on the other of that dead Lutheran formalism, from both of which the religious life of Germany had so long suffered. To the delineation of the development of historical Christianity he brought a generous and sympathetic, yet broad and impartial intellect. To him Christianity was a permeating force more than a series of dogmas, and the history of the church was throughout but the history of the divine life of Christ pervading humanity, to be understood only in proportion to the student's personal experience of the significance of the life of Christ. This is the meaning of Neander's famous aphorism—'Pectus est quod facit theologum.' The most striking characteristic of his great work is its objectivity in the portrayal of persons and the movement of events; its greatest merit is the admirable biographical skill with which the figures are made to pass before the reader; its one defect, the weakness with which the outstanding separate figures are fitted into their relation to the general movement of the history.

Neander's works, in the order of time, are monographs on Julian and his times (1812), St Bernard (1813), the Gnostics (1818), St Chrysostom (1822); *Denkwürdigkeiten aus der Geschichte des Christenthums und des Christlichen Lebens* (1822; 3d ed. 1845–46); *Antignosticus* (1826); the great *Allgemeine Geschichte der Christlichen Religion und Kirche* (6 vols. 1825-52); *Geschichte der Pflanzung und Leitung der Kirche durch die Apostel* (2 vols. 1833; 4th ed. 1847); *Das Leben Jesu Christi*, written as a reply to Strauss's work (1837; 5th ed. 1853); *Wissenschaftliche Abhandlungen* (1851); *Geschichte der Christlichen Dogmen* (1856). Most of these works are accessible in good English translations. See the studies by Hagenbach (1851), Otto Kraabe (1852), J. L. Jacobi (1882), and Adelbert Weigand, the last with a good bibliography appended (1889).

Neanderthal, a wildly romantic valley between Düsseldorf and Elberfeld in Rhenish Prussia. In a limestone cave in this valley was found in 1857 the skeleton of a prehistoric man, and the peculiar formation of the skull induced several archæologists to regard it as typical of a separate race of ancient cave-dwellers. Other authorities explain the abnormality as caused by disease during the lifetime of the individual.

Neap-tides. See TIDES.

Nearchus, an officer of Alexander the Great, was a native of Crete, who settled in Amphipolis during the reign of Philip, and became the companion and friend of the young prince Alexander. In 330 he was governor of Lycia and other provinces in Asia Minor. In 329 B.C. he joined Alexander in Bactria with a body of Greek mercenaries, and took part in the Indian campaigns. Having built a fleet on the Hydaspes, Alexander gave Nearchus the command of it. He left the Indus towards the end of November 325, and, skirting the coast all the way, arrived at Susa, in Persia, in February 324. His own narrative of his voyage has been preserved in the *Indica* of Arrian, the best edition of which is printed in C. Müller's *Geographi Græci Minores* (Paris, 1855).

Nearctic. See GEOGRAPHICAL DISTRIBUTION.

Neath, a parliamentary and municipal borough and river-port of Glamorgan, South Wales, on a navigable river of the same name, 8 miles ENE. of Swansea by rail. It is believed to stand on the site of the Roman station *Nidum;* and near it are the remains of an ancient castle, burned in 1231, and ruins of Neath Abbey, described by Leland as 'the fairest abbey in all Wales,' but now sadly decayed and begrimed by smoke and coal-dust. There are at Neath, which is one of the Swansea boroughs, extensive copper and tin-plate works and iron-foundries, and chemicals are manufactured. Neath is one of the Swansea district boroughs. Pop. (1851) 5831; (1881) 10,447.; (1891) 11,157.

Neat's-foot Oil is, as the name implies, an oil obtained from the feet of the common ox, either by splitting them up and boiling them over an open fire, or by treating them with superheated steam in a closed cylinder. See OILS.

Nebo. See ABARIM.

Nebraska, one of the central states of the American Union, and the eleventh in area, lies between 40° and 43° N. lat., and in 95° 23′—104° W. long., and is bounded by South Dakota, Iowa (separated by the Missouri River), Kansas, Colorado, and Wyoming. Area, 76,855 sq. m., of which one-fifth is in improved farms. The surface is chiefly an elevated, undulating prairie; it is very level in the eastern and southern portions, but in the north and west the 'Bad Lands' extend into the state, while to the north of the Niobrarah River there are great sandhills, composed of pebbles, gravel, and sand, covered for the most part with a sparse vegetation. The average elevation of the state rises from about 1200 feet in the east to 6000 feet towards the western border. The principal rivers are the Platte, Niobrarah, and Republican, all flowing east. The atmosphere is dry and invigorating, and, though great extremes of heat and cold are sometimes experienced, they are not usual. There are few swamps and marshes. The total rainfall in 1889 was 21·83 inches, the mean temperature 51·25° (range, from 94° above to 17° below zero). Buffalo and antelope are still, though seldom, seen; but the coyote, large timber wolf, fox, skunk, rabbits, &c. abound.

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The soil of Nebraska, except in the Bad Lands and sandhills, is mostly a rich black mould, 2 to 8 feet in depth. The staple crop is maize, of which enormous quantities are grown. Tobacco and the sugar-beet also are cultivated successfully; of the latter the first very large crop was raised in 1890, but already there are a number of factories established for the manufacture of beet-sugar, one at Grand Island turning out 250 barrels a day. The returns of agricultural products in 1889 show (in bushels): maize (3,945,500 acres), 144,217,000; oats, 38,951,434; wheat, 14,508,000; rye, 6,966,625; barley, 4,074,925; flax, 610,371; potatoes, 11,372,941; while 34,000 acres were under buckwheat, and 54,556 under miscellaneous crops. The uncultivated lands yield great quantities of hay, and Nebraska holds a good place among the stock-

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raising states; in 1889 it had, besides sheep, horses, and mules, 1,677,343 of cattle and 1,802,897 hogs.

While there are numerous factories in the eastern and southern parts of the state (there are nearly 200 in Omaha, and 120 in Lincoln), the manufacturing industry is of much less importance than agriculture. The articles produced include agricultural implements, vitrified brick for paving, woollen clothing, soap, and the beet-sugar already referred to; while in a dozen towns canning factories are in operation. The ever-changing current and dangerous sand-bars of the Missouri do not encourage commercial intercourse by river; but the trade by rail (5000 miles open in 1890) is very heavy. Omaha and Lincoln are ports of entry.

Nebraska has forty universities, colleges, and academies; and the public schools (6020 in 1890, with 240,300 pupils in attendance, and 9029 teachers) are liberally provided for. The state and private charitable institutions also are numerous. The state receipts for 1888 were $4,236,525, the expenditure $4,244,583. The assessed valuation of real property in 1890 was $115,360,973 in lands and $31,553,144 in railroads. Pop. (1860) 28,841; (1880) 452,402; (1890) 1,058,793. The principal cities are Omaha (139,526 in 1890), Lincoln, the capital (55,491), Beatrice, Hastings, and Nebraska City.

History.—Nebraska was included in the Louisiana Purchase, and was for many years a part of the North-west Territory. The way was prepared for settlers by the overland emigration to California in 1849. Nebraska territory was organised in 1854, with an area of 351,558 sq. m.; it extended north of British America, and west to the Rocky Mountains. But of this vast area great portions were afterwards carved out for Colorado, Dakota, and Idaho. Nebraska became a state in 1867.

Nebraska City, capital of Otoe county, Nebraska, is on the west bank of the Missouri River, 74 miles below Omaha (44 by rail). It contains the Nebraska College (Episcopal, 1863), the Academy of the Annunciation, an elevator, and a number of mills and factories. Pop. (1890) 11,492.

Nebraska River. See PLATTE.

Nebuchadnezzar. See BABYLONIA, I. 634.

Neb'ulæ are cloudy patches of light in the heavens. Some, as those in Andromeda and Orion, are visible to the naked eye, but the greater number can only be seen in telescopes of considerable power. Before the invention of the Spectroscope (q.v.) they were for a time all considered to be star-clusters. This instrument has shown that these clusters, which appear as nebulæ in small telescopes, are totally different in constitution from nebulæ proper (see STARS). Halley in 1716 gave a small list of 6 nebulæ, but the chief workers in this field are Messier, who in 1784 catalogued 103; Sir W. Herschel, who alone discovered more than 2500; and Sir J. Herschel, who added to them more than 2000. These lists, however, include many star-clusters. Nebulæ proper have been classified as (1) annular, (2) elliptic, (3) spiral, (4) planetary, and (5) nebulous stars. These various forms do not indicate *specific* differences, but rather result from (1) the various presentation of their edges and surfaces to the spectator, and (2) their differently condensed material. For example, the elliptic nebula in Andromeda has been shown by photography to consist of a spiral, or a congeries of rings, exhibiting thus in itself the marks of the first three classes. Planetary nebulæ show faint discs, often bluish in colour, whose structureless appearance is probably only due to our imperfect telescopes. The spectrum of nebulæ consists usually of a few bright lines indicating their gaseous structure. To what gases these lines belong is still uncertain, although they have been attributed to nitrogen, hydrogen, and magnesium vapour. In a few cases, as in a small nebula in Taurus and the great one in Orion, their light certainly varies in intensity, and they are sometimes associated with variable or temporary stars. They form, according to the theory of Laplace and Sir W. Herschel, the earliest stage in the formation of stars and planets. Though certainly not yet proved, this *nebular theory* is very generally accepted, and has been greatly strengthened by Lockyer's recent spectroscopic researches.

Necessaries. See INFANT.

Necessity may be *natural*, according to the laws of nature; *logical* or *mathematical*, according to the laws of human intelligence; *moral*, according to moral law. See CAUSALITY, LOGIC, ETHICS, KANT, EMPIRICISM. Necessity, Necessitarianism, or Necessarianism, is also a name for the view that denies the freedom of the will. See WILL.

Neches River rises in eastern Texas, and flows about 350 miles SSE. to Sabine Lake, its waters passing thence by Sabine Pass into the Gulf of Mexico.

Neck. See SPINAL COLUMN, THROAT.—Of diseases of the neck, STIFF-NECK is the term commonly applied to a condition of the neck in which lateral movement of the head causes great pain, and which is due to rheumatism of the muscles lying on the side of the neck, especially the sterno-mastoid. In the great majority of cases only one side of the neck is affected, the head being drawn more or less obliquely towards that side; but occasionally both sides are equally attacked, in which case the head is kept stiffly erect and looking straight forwards. As long as the head is allowed to remain at rest there is merely a feeling of discomfort; but every movement is extremely painful. This affection is usually caused either by exposure of the part affected to a current of cold air, or by wearing wet or damp clothes round the neck (see RHEUMATISM).—*Derbyshire Neck* is a synonym for Goitre (q.v.).—For Necks in geology, see IGNEOUS ROCKS.

Neckar, one of the largest tributaries of the Rhine, and the principal river of Würtemberg, rises on the eastern declivity of the Black Forest, near the village of Schwenningen. It has a winding course of 250 miles, and joins the Rhine at Mannheim—the other towns on its banks being Tübingen, Heilbronn, and Heidelberg. From Cannstadt, about midway in its course, the Neckar is navigable. Fair wines are grown on its banks.

Necker, JACQUES, a famous financier and minister of France, was born 30th September 1732, at Geneva, where his father, a native of Küstrin in Pomerania, had become professor of Public Law. At fifteen he went to Paris as a clerk to the banker Vernet, and in 1762 established the famous London and Paris bank of Thellusson and Necker. His public career commenced with his becoming a syndic of the French East India Company, as well as minister for the republic of Geneva at Paris, and with his marriage (1764) to the charming, accomplished, and ambitious Suzanne Curchod, who was born in 1737, the daughter of a pastor near Lausanne, and had loved Gibbon for five years with a constancy of which his colder temper was not worthy. The rich banker had first wooed Madame de Verméneux, a wealthy young widow, who scrupled at her suitor's lack of nobility, but he easily transferred his affections to her young protégée, and he proved till death an affectionate and faithful husband. She was religious and above reproach in character, yet her *salon* became a centre of all the intellect of Paris, and her Fridays drew together such celebrities

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as Grimm, Diderot, the aged Buffon, Marmontel, Thomas, D'Alembert, and the Abbé Galiani. In 1773 Necker gained the prize of the French Academy for an *éloge* on Colbert, and in 1775 he distinguished himself still further by his *Essai sur le Commerce des Grains*, in answer to the free-trade policy of the great Turgot, in which he claims for the state the right of fixing the price of grain and, if necessary, of prohibiting its exportation. Already also he had lent money to the needy government when in 1776, Protestant as he was, he was made Director of the Treasury and next year Director-general of Finance. He devoted five years of hard work to his hopeless task, and, if he showed no great statesmanlike foresight, he proved himself an honest, prudent, and sagacious minister. Indeed, some of his remedial measures were a real boon to suffering France, as his more equitable adjustment of taxes, his establishment of state-guaranteed annuities and *monts de piété*. But his most ambitious scheme—the establishment of provincial assemblies over all France, one of the functions of which should be the apportionment of taxes, proved a disastrous failure. His retrenchments were hateful to the queen, and the publication in 1781 of his famous *Compte Rendu*, a plain statement of the financial state of France, was promptly made the occasion for his dismissal. He retired to Geneva, carrying with him the respect of all Frenchmen; and here he busied himself with writing, and married his only daughter in 1786 to the Swedish Baron von Staël-Holstein. In 1787 he returned to Paris, and when M. de Calonne at the opening of the Assembly of Notables in that year cast a doubt on the truth of the *Compte Rendu*, he published a justificatory minute, which drew upon him the king's displeasure and his banishment to a distance of forty leagues from Paris.

He was recalled to his former office in September 1788, and quickly made himself the popular hero of the hour by recommending the summons of the States-general. But the successful banker was infatuated with his popularity, and quickly proved himself unfit to steer the ship of state amid the storms of revolution, while his constitutional irresolution in the hour of danger drew the well-meaning king into the fatal error of being forced into recognising the union of the three estates, instead of taking the lead in freely granting what was inevitable. On the 11th July, while sitting at dinner, he received the royal command to leave France at once, but the fall of the Bastille three days later frightened the king into recalling him amid the wildest popular enthusiasm. But now his incompetence for greater matters than accounts was at length fully discovered, and after with fatal obstinacy spurning the help of Lafayette and Mirabeau, and leading the king to surrender his suspensive veto and the Assembly to stultify itself by a self-denying ordinance that ministers should not be chosen from its members, which made a really responsible parliamentary government in France impossible, he finally laid down his office unnoticed and without regret, after the carrying of Mirabeau's scheme for relieving immediate financial distress by the issue of *assignats*, September 1790. He retired to his estate of Coppet near Geneva, and here his wife died, 6th May 1794, while he himself, after publishing books which had no longer any importance, followed her on 9th April 1804.

The only other works that need be named are *De l'Administration des Finances de la France* (3 vols. 1784), *Sur l'Administration de M. Necker, par lui-même* (1791), *Du Pouvoir exécutif dans les Grands États* (2 vols. 1792), *De la Révolution Française* (last ed. 4 vols. 1797), and *Dernières Vues de Politique et de Finance* (1802). A collected edition was edited by his grandson (15 vols. 1820–21). See also the *Manuscrits de M. Necker*, published by his daughter in 1804; and for his life, her work, *La Vie privée de M. Necker* (1804), and his grandson's *Notice sur la Vie de M. Necker*, prefixed to the collected edition of his works. Five volumes of *Mélanges* from his wife's journals and papers were printed (1798–1802). The story of her life is charmingly told, from the papers preserved at Coppet, in the Comte D'Haussonville's work, *Le Salon de Madame Necker* (2 vols. 1882; Eng. trans. 1882).

Necklace, DIAMOND. See DIAMOND NECKLACE.

Necromancy, an ancient mode of divination by conjuring up the spirits of the dead to give answers about the future. A classical example is the Old Testament story of the witch of Endor. The eleventh book of Homer's *Odyssey* bears the title of *Nekromanteia*, and in it the shade of Tiresias is brought up and consulted by Ulysses. In most parts of Greece necromancy was practised by priests or consecrated persons in the temples; in Thessaly it was the profession of a distinct class of persons called Psychagogoi. See DIVINATION, and MAGIC.

Necropolis, a Greek term, meaning 'the city of the dead,' and applied to the cemeteries in the vicinity of ancient cities. It occurs in classical antiquity only as applied to a suburb of Alexandria, lying to the west of that city, where the corpses were received and embalmed. Here Cleopatra applied the asp to her breast. See CEMETERY.

Necrosis (Gr. *nekros*, 'dead') is a term employed to denote the death or mortification of bone, but often restricted to the cases in which a considerable part of the shaft of a long bone dies, either directly from injury or from violent inflammation, and is enclosed by a layer of new bone; the death of a thin superficial layer which is not enclosed in a shell of new bone being usually termed *exfoliation*, and the more gradual destruction of cancellous tissue Caries (q.v.). The bones of the lower extremity—the femur and tibia—are those which are most frequently affected by necrosis, but any bone may be the seat of the process. The jawbones, however, very often suffer from it in persons engaged in making lucifer matches, the disease being induced by the pernicious action of the vapour of phosphorus. The more general use of red or amorphous phosphorus for this purpose has rendered necrosis of the jaws much less common. The dead bone, known as the *sequestrum*, presents a rough appearance, as if worm-eaten. If the membrane investing the bone (the periosteum) remain healthy, it deposits lymph, which speedily ossifies, forming a shell of healthy bone, which completely invests the dead portion. The essential point in the treatment is the removal of the *sequestrum*, which is too purely a surgical operation to be described in these pages.

Nectar, the name given by Homer, Hesiod, Pindar, and the Greek poets generally, and by the Romans, to the beverage of the gods, their food being called *Ambrosia* (q.v.). But Sappho and Alcman make nectar the food of the gods and ambrosia their drink. Homer describes nectar as resembling red wine, and represents its continued use as causing immortality. By the later poets nectar and ambrosia are represented as of most delicious odour; and sprinkling with nectar, or anointing with ambrosia, is spoken of as conferring perpetual youth, and they are assumed as the symbols of everything most delightful to the taste.

Nectarine. See PEACH.

Nectary, in Botany, an organ in the flowers of many phanerogamous plants, devoted either to the secretion or the reception of honey. Of the former kind are nectariferous glands, scales, and pores; of the latter, tubes, cavities, &c.

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Need-fire. See FIRE, Vol. IV. p. 630.

Needle-gun. See BREECH-LOADING, RIFLE.

Needles. The sewing-needle must be one of the oldest implements used by man. Bone needles with eyes are found in the reindeer-caves of France, and among the finds on the sites of the prehistoric lake-dwellings of central Europe there are numerous 'eyed' needles of bone and of bronze, but as yet only a single one of iron appears to have been discovered. Ancient bronze needles, 3½ inches long, have been found in Egypt, and there are surgeon's needles and thimbles which have been used in sewing with ordinary needles from Pompeii in the Naples museum. Savage races use needles of various materials, such as bone, ivory, wood, and metal. Some tribes do their sewing with awls of bone or of thorns with which they make holes, and then by pushing and pulling work the thread or string through them in the same manner as a shoemaker does. The Fuegians in sewing skins even make a tie at every hole. The Kaffirs make needles of iron or steel, with a constriction under the pin-like head, round which the end of the thread is tied instead of being passed through an eye.

Steel needles were made in 1370 at Nuremberg, at which early time its artisans were skilled in working metals, including the drawing of wire in iron, steel, and brass. Previous to 1563 the wire used for making needles in England was imported from Spain and Germany, but in England the manufacture was not of much importance till about 1650. The early-made needles were all square-eyed. The seat of the needle-manufacture in Great Britain is at Redditch near Birmingham, where in the best factories considerable improvements have in recent years been effected by the adoption of new mechanical appliances, and especially of automatic machines in some of the processes.

In the system of processes, about twenty-two in number, by which needles are now made, the first is the cutting of the coils of wire into two-needle lengths by a guillotine shearing-machine. The wire is of the best crucible steel, and requires to be very carefully gauged to size. After being cut, the lengths of wire are raised to a dull red heat and placed in loose bundles inside iron rings to be straightened by rolling each bundle backwards and forwards on a face plate with a slightly curved bar,

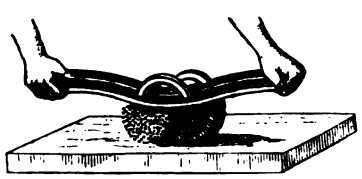

Fig. 1.

through which the rings project (see fig. 1). The wires are next pointed at both ends, which was formerly entirely done by hand on a grindstone with a concave surface. An arrangement is now in use by which the wires are withdrawn—one closely following another—from a hopper by a pulley revolving at right angles to the grindstone, the wires being held to the face of the pulley by an india-rubber band. In their passage between the pulley and the grindstone the wires (double-needle blanks) revolve on their axes and become pointed at one end, and the process is repeated for the pointing at the other end. The fine steel dust formerly so injurious to the health of the hand-grinders has for some years been drawn away from the operative by the suction of a strong current of air. The stamping of these two-length blanks in the middle by the hand-worked stamping-machine so as to produce the flat of the eyes and the mark for the holes (fig. 2), as well as the punching of the holes by a screw press, can now be accomplished by more expeditious machines.

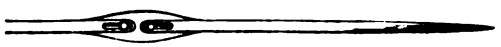

Fig. 2.

By the newer method the wire blanks are automatically fed into a quick-running belt-driven machine, in which a punch and dies form the prints or flats for the eyes. The next operation consists in punching two oval holes through the two prints of each blank by a vertical belt-driven punching-machine. After being eyed the still double blanks—they are now rather double needles joined at the heads by thin fins—are 'spitted' through their eyes on two wires flatted at one end to retain them. The burr made by the punch and die (stamping) is now removed by filing the spitted needles on both sides, and after being broken in two between the heads, which are then also smoothed by filing, a row of single needles is left on each spit, as shown in fig. 3.

Fig. 3.

In the tempering process which the needles undergo at this stage, they are first hardened by being laid on a plate and raised to a red heat in a furnace, after which they are dipped in cod-oil, kept cool by running off a portion as it gets warm and replacing it by an equal quantity of cold oil. The needles being now hard and easily broken, are made less brittle by placing them on a continuous band of wire gauze which travels slowly over gas flames. The next step is to roll the needles one by one under the finger on a smooth stone, and thus weed out those that are bent. In parcels of 50,000 they are next washed and scoured with soap to remove any of the oil used in tempering which still adheres, and the eyes are afterwards 'blued' to soften them. In the case of needles of fine quality the eyes are gilt. By one method the eyes are polished by threading them loosely on wires carried by standards fixed to a tray or platform which is moved rapidly with a reciprocating motion in a horizontal plane. In about one hour, with the assistance of a little fine emery and oil, the constant swinging of the needles on the wire smooths their eyes so as not to cut the thread. But the eyes of the best needles are hand-polished with fine emery on flax threads. The next step is to grind the heads and set the points by hand on a rapidly-revolving stone of fine texture.

An ingenious machine is employed for the final polishing of the shanks. The needles are fed in a longitudinal direction, in rows one deep, between transverse leather-covered rollers, with holding rollers above them. Besides turning on their own axes, a lateral as well as a backward and forward motion is given to the rollers, which produces a high polish on the needles. The older method of polishing needles is to put many thousands of them along with putty powder and oil in a canvas bundle wound round with a cord. A number of these rolls or bundles are then placed between two wooden slabs—the upper one heavily weighted—and made to roll backwards and forwards in a polishing-machine for several hours. When taken out of the canvas and the polishing material adhering to

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them removed with soap and water, the needles have a bright polish. It should be said that by this process, before the needles are thus rolled with putty powder and oil, they are previously rolled in a similar way with sand and emery-powder. After receiving a high polish the needles are not touched again by hand before leaving the factory, in order to prevent rust.

The needles now require to be laid with their heads in one direction. A gun-metal disc revolving vertically takes up each needle by a groove in its periphery, and lets it fall on an inclined glass plate. Owing to the taper form of the pointed ends of the needles they describe an arc in revolving, so that those with the points in one direction roll to the right and the others fall round to the left. The finished needles, although intended to be of the same size, always differ to some extent in their lengths, so that those of exactly one size require to be separated from other lengths by the sorting process, in which gauges are used. Lastly, the needles are papered either by being spitted on cloth pasted to paper, or by being made up into small packets, in which case the bits of paper are cut and folded in a machine like that used for envelope-making.

It is estimated that about 50 millions of needles and articles akin to them are made weekly in the Redditch district. These are of many sorts and sizes, including large needles for sewing canvas and such special kinds as are used for upholstery, surgical, and some other purposes. Recently a grooving machine has been used in the manufacture of sewing-machine needles instead of the old stamping process. See the *Engineer*, vol. lxii. p. 224 (1886); and the volume on the Birmingham trades in Bevan's *British Manufacturing Industries*.

Needles. See WIGHT (ISLE OF).

Needlework. See BAYEUX, EMBROIDERY, LACE, and TAPESTRY.

Neerwinden, a small village in the north-west corner of the Belgian province of Liége, is noted for the victory gained by the French under Luxembourg over the English under William III. (29th July 1693), and also for the defeat of the French under Dumouriez by the allies under the Prince of Coburg (18th March 1793).

Ne Exeat Regno is the title of a writ issued by a superior court to prevent an individual leaving the kingdom, unless he gives security to abide a decree of the court.

Neff, FELIX, a Protestant pastor, born at Geneva, 8th October 1798, was in his twenty-sixth year ordained, in England, to minister to the neglected inhabitants of the lofty Alpine valleys in the east of the department of Hautes Alpes. His parish was a most difficult one to minister to, owing to its mountainous nature and great extent (80 miles long), and the uncivilised character of the people. But with unwearied devotion and simple piety Neff laboured amongst them like his chosen model, Oberlin (q.v.), until his death, 12th April 1829. See Memoir by W. S. Gilly (1832), and *Letters and Biography* (trans. from French of Bost, 1843).

Negapatam, a seaport of British India, on the Coromandel coast, 180 miles S. by W. of Madras city. Originally a Portuguese settlement, it was taken by the Dutch in 1660, and by the English in 1781. The port trades in cottons, live-stock, ghi (exported), and spices, piece-goods, coal, gunny bags (imported), to the total annual value of £904,400, chiefly with Burma, the Straits Settlements, and Ceylon. Pop. (1881) 53,855.

Negligence. See LIABILITY.

Negritos is the name given by the Spaniards to certain Negro-like tribes inhabiting the interior of some of the Philippine Islands, and differing both in features and manners from the Malay inhabitants of the Eastern Archipelago. They seem to be more closely akin to the Andaman Islanders than to either Papuans or any other stock; and are also known as Aëtas or Itas (see PHILIPPINE ISLANDS). The name is also used in a wider sense for the Papuans and all the Melanesian peoples of Polynesia (q.v.). For certain negroid African peoples, see ETHNOLOGY.

Negroes. The negro and negroid people at home are dealt with at AFRICA and ETHNOLOGY. In America the word negroes is used for all of African descent, whether of the true negro or of Bantu stock. The total number of negroes of pure or mixed blood in America has been recently estimated as somewhat above twenty millions, of whom about one-third are in the area of the United States. Their importation has been going on steadily since the early years of the 16th century, when it was begun by the Spaniards, even the good Las Casas recommending it in the interest of the native Indians. Both Queen Elizabeth and King James I. issued patents to English slave-trading companies operating between the coast of Guinea and the American colonies. England, by the treaty of Utrecht (1713), engaged to carry out the contract of the old French Guinea Company, and to import into the New World 130,000 slaves in the course of the next thirty years, and is said to have more than made good the engagement. In the United States the traffic was open and active until the passage of the Act of 1794 prohibiting the importation of slaves into any of the federal ports. Long after this it continued to be a brisk business in the West Indies and South America. As late as 1840 there were seventy-five ships plying constantly between Brazilian ports and the African coast, bringing cargoes of 300 or 400 slaves at each trip. The principal points at which the slaves were obtained were along the coast of Guinea, especially on what was known as the Slave Coast, between the rivers Lagos and Assinie, where were the crowded marts of Waidah and Anamaboe, and again along the Angola coast, from 8° to 18° S. lat. In these two regions the traders encountered two quite different branches of the African race, and their human wares in America show that they were derived from different sources. Along the Guinea coast, whence most of the slaves brought to the United States were derived, the population belongs to the true negro type. As most of the coast tribes enriched by the traffic did not sell their own members, but obtained the slaves from the interior by capture or purchase, we do not find traces of the Fans, Ashantis, or Dahomis in the negro population of our country, but well-marked characteristics, both linguistic and anthropologic, of the interior tribes, especially of the extensive Mande or Mandingo stock. Such words as *Juba* and *Obi* are traced to this stock, and a method of counting in use among the negroes of Maryland about the beginning of the 19th century proved to be derived from the Mandingo numerals. In Brazil and other parts of South America the preponderance of importations was from the negroid stock south of the equator, whose dialects and physical traits are allied to those of the Kaffirs and Zulus of the east coast (Bantus). The slaves in all parts, however, being from mixed stocks, their descendants do not present any well-marked anthropologic peculiarities inside those of the race. As a rule, they are in strength equal to the whites, and in endurance of exposure and labour under a tropical sun are superior to all other immigrants. The experiment was officially tried in British Guiana to ascertain

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the relative working powers in field labour of negroes, Chinese, and East Indian coolies. The negroes performed twice as much labour as the coolies and a third more than the Chinese, although the latter were the most intelligent in their work. It is usually held that the negro is not naturally industrious; but this seems to some extent answered by the severe field labour of many tribes, both men and women, in their native continent, and by the official reports of the United States government showing a greater acreage of land under cultivation in the former slave states and a larger crop of cotton than before the civil war. When under the control of a strong social organisation, and with obvious motives for industry and economy before his eyes, the American negro is both industrious and provident, and the instances are numerous where members of the race have accumulated fortunes of respectable size. Their viability appears on the whole to be about the same as the whites, except in the more northern states, where it is unquestionably much less. Thus, according to the census of the United States in 1880, the total average annual mortality of the white male population was 15·08, while that of the black population was 17·19, a showing which might fairly be attributed to difference of social position and consequent more careful observance of hygienic laws by the whites; but in the northern states of the Union there was a contrast which could not be so explained, but must be attributed to an inability of the African to withstand the cold of a high latitude. The proportion of deaths per thousand was as follows:

	Whites.	Negroes.
Connecticut	15	22·41
Dakota	8·8	25·89
Massachusetts	19·06	24·41
New Hampshire	16·23	26·5

Apart from this official testimony, it has long been matter of common observation that in New England and Canada the negroes gradually but surely perish. The diseases to which they are especially subject are those connected with the organs of respiration, as pneumonia, tuberculosis, pleuritic affections, and bronchitis. On the other hand, in the south they are less subject to malarial diseases, to yellow fever, to hepatic derangement, and to sunstroke than the white population. It is generally conceded that they are not so liable to acute alcoholism (delirium tremens) as the whites, which may be attributed to the inferior susceptibility of their nervous systems. The special senses are usually acute and correct: colour blindness is four times commoner among whites than with negroes, and the vocal powers of the latter are perceptibly greater. From a number of autopsies of adult males carried out during the civil war, it results that the lungs are relatively smaller and the liver larger than in the whites. The assertion has been made that the average weight of the brain in the negroes of the United States is greater than that of the true African negro; but repeated dissections tend to disprove this statement. No change whatever has been observed in the colour of the African in any part of America so long as the blood has been unmixed. Observations conducted in Guiana, however, would seem to show that the hair may undergo some alteration, rendering it slightly less woolly; and it is stated positively that the odour peculiar to the negro is not found in the wild negroes of that country who have for generations lived apart in the woods. This is certainly not the case in the negroes of the United States, and it is likely that the Guiana tribes are descendants of negroids from Angola, who have little or none of the odour of the true negro of the Soudan. There is a prevalent opinion that instances of uncommon longevity are more frequent among the coloured than the white population; and according to some statistics which have been published, the number of centenarians of this race in the southern United States in proportion to its membership is a hundred times that of the French! The explanation of this is simply that old negroes very rarely know their own age and love to magnify it; in other words, no dependence is to be placed on the statistics. There is no evidence of exceptional longevity among them.

The change from one continent to another does not appear to have reduced the fecundity of the race, which, it is well known, stands at a high mark in Africa. It has been calculated that in the United States at present the white race increases annually at the rate of 2·9 per cent., while the coloured population, including all shades, increases 3·4 per cent. This preponderance much more than makes up for the slightly higher death-rate. It is, however, not directly attributable to a greater natural fertility, but to the fact that a coloured woman very rarely remains unmarried, and does not avoid offspring.

The disposition of the negro is usually pacific and cheerful. He is not easily depressed by poverty or thoughts of the future. Content that his immediate wants are provided for, he rarely prepares for a distant contingency. Eminently gregarious in his instincts, he is usually to be found in certain streets and quarters of the town exclusively occupied by members of his own race. His interest in the past is weak, and few or no reminiscences of his ancestral languages, traditions, superstitions, or usages have been retained. His religion is emotional, and exerts but a moderate influence on his morality. Frequently it is associated with superstitious beliefs and rites known as Voodoo or Obi mysteries. It is believed by some that these are relics of the fetichistic worships of equatorial Africa, but the connection has never been demonstrated; on the contrary, the tales of the sacrifice of children, of ritual cannibalism, and of obscene ceremonies alleged to prevail in Hayti, and to a less degree among the negroes of other parts of America, have been shown by W. W. Newell to rest on very doubtful authority, and, if they occur at all, are the actions of a very few superstitious fanatics. The word *Voodoo*, or, as usually pronounced in the United States, *Hoodoo*, is a Creole form of the French *Vaudois*, and is etymologically derived from the period of the persecution of the Vaudois or Waldenses, who were represented by their opponents as sorcerers and necromancers, whence the name *Vaudois* came to be synonymous with 'witch' or 'wizard.' By a similar Creole French corruption the word *Wanga*, which among the negroes of Louisiana and Hayti means a philter or charm, and as a verb, 'to bewitch,' is, in spite of its African physiognomy, the French *Onguent*, an ointment or salve, such preparations being currently believed to possess magic powers. It is argued, therefore, that both the words and practices are of European origin. Nevertheless, it is unquestionably true that among the negroes both of the West Indies and the United States there is a widespread faith in charms, philters, and fetiches. In the latter country the employment of these means to cast an evil spell upon, or, as it is called, 'to cunjer' (to conjure), a person is familiar to every one at all acquainted with the folklore of the coloured people. The maleficent influence can be exerted by obtaining something belonging to the victim and doing some injury to it, or by securing a little of his blood, or by burying certain roots in the path where he is accustomed to walk, or by scattering brown paper before the door of his

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house, or in many other ways. In the West Indies an Obi bottle is often hidden in the house or goods of an enemy. It is filled with pins, rags, pebbles, small sticks, leaves of certain plants, &c. The result is often successful; for a negro who believes himself 'cunjer'd' will refuse food, and sink into the profoundest dejection, resulting occasionally in death. That a serpent or snake plays any prominent part in these Obi rites, as has often been stated, does not appear confirmed. Nor is it a prominent figure in the stories and folk-tales of the race in America. These fictitious narratives are very numerous, the negro being a tireless talker and *raconteur*. Many of them reveal a high stage of the art of story-telling, as the Georgia tales collected by J. C. Harris and Colonel C. C. Jones, and numerous others from the southern states by various writers. Many of them belong to the class of 'beast-fables,' similar to some which have been collected among the American Indians and the natives of the African continent, and such as were favourite staples of amusement in Europe during the middle ages. One of the principal figures is the rabbit (the 'brer rabbit' of the 'Uncle Remus' tales). He figures conspicuously not only in the southern United States, but in the West Indies and on the Amazon (Hartt), and as *tio conejo* ('uncle rabbit') in the folklore of the Venezuelan negroes (Dr Ernst). This unimportant animal also plays a leading part in the mythology of various American-Indian nations, as the Algonquins and Mexicans (Aztecs); and it appears not unlikely that its prominence in negro-American folklore was a loan from this source. Along with story-telling, singing and music are favourite diversions of the coloured population. This tendency is a direct inheritance from their African ancestry, as throughout that continent the natives are passionately fond of these diversions. In Central America the negroes still employ the *marimba*, a native African instrument with wooden keys placed over jars or gourds, the keys being struck with a stick. In the United States the violin, the fife, and the guitar are used, but the favourite is the 'banjo,' an instrument of African derivation, modified from the guitars with grass strings still in use on the Guinea coast. With these simple means they produce music of pleasant though not artistic character. In individual instances (as Blind Tom, born in Georgia in 1849) members of the race have attained remarkable skill on the piano and organ, rendering the most difficult compositions with spirit. No negro composer, however, has attained celebrity. Their songs are numerous, many of them of a religious character, others turning on the incidents of daily life. They are generally defective in prosody and without merit, being often little more than words strung together to carry an air.

The negro is ambitious for education, but unwilling to make the necessary mental effort to obtain it. In the public schools of the United States, where they are on the same footing as the white children, their progress is about equal up to the age of puberty. But after that important physical change there supervenes a visible ascendency of the appetites and emotions over the intellect, and an increasing indisposition to mental labour. The consequence is that in the higher education they fall notably behind the whites, and it is a rare exception for one of them to undertake the studies requisite for a profession; and when one does, he is content with what is barely sufficient for its remunerative practice. The social position of the members of the race in some parts of South America is little different from that of the whites. This is also theoretically the case in the United States since the civil war; but the natural sense of inequality between the two races is making itself felt in the latter country, and they are probably now farther asunder in sympathies than they were at the close of the war, both in the northern and southern states. Many thoughtful and learned men see in the increasing coloured population a standing menace to the institutions and culture of their country, and the project has been seriously urged to deport the whole negro stock back to Africa, and prevent others from coming to the country.

See SLAVERY, UNITED STATES, BRAZIL, JAMAICA, &c.; G. W. Williams, *History of the Negro Race in America* (2 vols. New York, 1882; Lond. 1883); Blyden, *Christianity, Islam, and the Negro Race* (1887); H. J. Bell, *Witchcraft in the West Indies* (1890); W. L. Clowes, *Black America* (*Times* letters; Lond. 1891); and many articles in the *American Folk-lore Journal*.

Negroponte. See EUBŒA.

Negus, a compound of either port or sherry and hot water sweetened with sugar and flavoured with lemon-peel and spices. It is a favourite beverage in England, and derives its name from a Colonel Francis Negus (*t.* George I.).

Negus. See ABYSSINIA.

Nehemiah, who, next to Ezra, among all the men whose names have been handed down, had the most important share in the making of post-exilic Judaism, comes before us principally in certain fragments of autobiography imbedded in the canonical book that now bears his name. From these we learn that he was a Jew who had for some time held the post of cupbearer to Artaxerxes Longimanus ('King of Babylon,' xiii. 6), when, at the winter-palace of Shushan or Susa, towards the end of the year 445, he was surprised and saddened with unexpected tidings of the very unprosperous state of Jerusalem. How or when the events now for the first time reported to him had happened is not related, but the result had been to leave the city impoverished and defenceless. In the following spring (444), having obtained leave of absence from court for a limited time, and full powers to act as governor-extraordinary of Judæa, he set out without delay for the city of his fathers. The first necessity was to have the walls rebuilt; on his arrival no time was lost in taking the necessary steps, and the entire structure was completed, in the face of much opposition, within fifty-two days from its commencement (vi. 15). His next care was to reinforce the population of the depleted capital by drafts from the surrounding districts, and in particular, it would seem, to bring back to town the Levites who, through non-payment of dues, had been compelled to abandon service at the temple and give themselves to field labour throughout Judæa. Arrangements having been made for the regular support of the sacred offices, the feast of the dedication of the walls was now gone about with great pomp and joy. It is to be presumed that Nehemiah returned soon afterwards to his duties at the Persian court. We read (xiii. 6; cf. v. 14) of a second visit of Nehemiah to Jerusalem, twelve years afterwards, on which occasion he either initiated or renewed and completed certain reforms which henceforth were among the most characteristic features of post-exilic Judaism. One of the most marked of these was the crusade against mixed marriages and the separation of the Jews of pure descent from the 'mixed multitude' (xiii. 3). His cleansing of the temple, and expulsion of Tobiah from its precincts, ultimately led, it would seem, to the formation of the Samaritan community as a separate religious organisation. Another of Nehemiah's reforms was the stringent enforcement of a strict law of Sabbath observance. Others are to be found in the arrangements he made for the permanent maintenance of the temple

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worship and the support of the priests and Levites. In this connection, and as bearing on the criticism of the Pentateuch, Neh. x. 32 [33] ought to be compared with Ex. xxx. 13, Neh. x. 33 [34] with Ex. xxix. 38, 39, and Num. xxviii. 3, 4; also Neh. x. 37 [38] with Lev. xxvii. 32, and Neh. x. 36 [37] with Num. iii. 12, 13. How long Nehemiah's second visit to Jerusalem lasted we are not told, nor does authentic history record the time or place of his death. In the late apocryphal book of 2 Maccabees a spurious letter, purporting to date from the year 124 B.C., is preserved, where wonderful things are told as to Nehemiah's rekindling of the sacred altar-fire by means of 'naphthar,' and it is also said (2 Macc. ii. 13) that he founded a library in which he 'gathered together the acts of the kings, and the prophets, and of David, and the epistles of the kings concerning the holy gifts.' This last statement can only be used with great caution as bearing on the history of the canon.

The canonical Book of Nehemiah originally formed the closing chapters of the undivided work, Chronicles-Ezra-Nehemiah (see CHRONICLES), for which two of the most important original sources were the highly characteristic memoirs of Ezra and Nehemiah. These have been preserved, however, only in so fragmentary and dislocated form that it is exceedingly difficult now to gather from them the true order of the events to which they relate. The book in its present shape begins (Neh. i. 1–vii. 5) with Nehemiah's account of the building of the wall and the difficulties he had to encounter. The depleted state of the city had suggested to him a census of Judæa, and in this connection is given the list of those who had come up with Zerubbabel nearly a century before (vii. 6–73 *a*); this list, apart from very numerous and considerable textual variations, is identical with that in Ezra ii. The reader might now expect to find a corresponding census for Nehemiah's own time, but instead of this the next three chapters give an account of the reading of the law by Ezra, the celebration of the feast of tabernacles, the fast and repentance of the people, and the solemn sealing of the covenant to observe the law. These chapters are continuous with Ezra x. In Neh. xi. the interrupted narrative is resumed, or rather the place of narrative is taken by a series of name lists (inhabitants of Jerusalem, heads of houses in Judah and Benjamin, priests, and Levites). Chapter xii. 27–43 then gives Nehemiah's description of the dedication of the walls, and the rest of the book (xii. 44–xiii. 31) consists of the account of the reforms he effected in the spirit of the covenant as contained in x. 30–39. It would seem as if the editor of Chronicles-Ezra-Nehemiah had before him two distinct documents relating to Ezra and Nehemiah respectively, but that into the first of these between Ezra x. 44 and Neh. vii. 73 *b* (originally continuous) he judged it expedient to introduce from the second a section of Nehemiah's memoirs (Neh. i. 1–vii. 5) in order to prepare the way for the mention of Nehemiah in Neh. viii. 9 and x. 1 [2]. The work mentions Jaddua, who was high-priest in the days of Alexander the Great, and also Darius, the last of the Persian kings (xii. 22). It cannot, therefore, have been compiled earlier than 333 B.C., and probably it ought to be dated at least half a century later. In the gradual compilation of the Jewish canon, the Ezra-Nehemiah section of the larger book was first added to the list of authoritative writings, some account of the times subsequent to the captivity being plainly required. The need for a second history, parallel with that contained in the 'former prophets,' was not so obvious; Chronicles, therefore, the remaining portion of the work, was the very last to take a place among the Old Testament Scriptures.

For Nehemiah's place in the Old Testament dispensation, see the histories of Israel by Ewald, Stanley, Hitzig, Kuenen, Wellhausen, and others. Compare Reuss, *Geschichte der heiligen Schriften Alten Testaments* (2d ed. 1890); and Sayce, *Introduction to Ezra, Nehemiah, and Esther* (3d ed. 1889). The best commentary on the Book of Nehemiah is that of Bertheau-Ryssel (1887). See also Keil (Eng. trans. 1873), and Rawlinson in *Speaker's Commentary*. All three works contain references to earlier authorities.

Neilgherry Hills (properly *Nilgiri;* Sanak. *nîla*, 'blue,' and *giri*, 'mountain'), a mountainous district in the south of India, rising abruptly from the plains to the height of 6000 feet, though individual peaks shoot up to 8760 feet. The mass is entirely isolated, with the exception that a precipitous granite ridge leaves its western face and connects it with the Western Ghâts. The surface consists of grassy uplands with large groves of forest trees; but the lower slopes are heavily timbered. The Neilgherry Hills are inhabited by five distinct tribes, of whom the Todas are the most interesting. They speak a Dravidian dialect and practice polyandry; in 1881 there were only 675. The men are tall and athletic, with Roman noses, black bushy beards and eyebrows, but they are dirty in their habits. Their sole occupation is tending cattle. Owing to their great elevation, the Neilgherry Hills have a delightfully cool climate, and are much resorted to on this account by invalided Europeans, the principal station being Ootacamund (q.v.). See H. B. Grigg's *Manual of the Nilgiri District* (1880).

Neisse, a town of Prussian Silesia, and an important fortress of the second rank, is situated in a broad valley on the Neisse, an affluent of the Oder, 50 miles SE. of Breslau. It manufactures arms, linen, and chemicals, and has great wool-markets. Pop. 20,507. Neisse was formerly the chief town of a principality, and residence of a prince-bishop.

Nejd. See ARABIA, WAHABIS.

Nekrasoff, NIKOLAI ALEXIEVITCH, a Russian lyrical poet, was born in Podolia in 1821, entered the army, but soon devoted himself to literature, editing a newspaper and a monthly magazine. He died 7th January 1878. Belonging to the realistic school, he gave powerful expression to the popular aspirations and social tendencies of his race in a series of poems that have been often re-edited.

Nélaton, AUGUSTE, surgeon, was born at Paris, 18th June 1807, studied there, and, after serving as surgeon in various hospitals and lecturing at the faculty of medicine, became in 1851 professor of Clinical Surgery, and in 1866 surgeon to the emperor. He became a member of the senate in 1868, and died 21st September 1873. Besides his great *Éléments de Pathologie Chirurgicale* (5 vols. 1844–60), he wrote on tumours of the breast, and the operation for cataract.

Nellore, a town of Madras Presidency, capital of a district of the same name, situated on the right bank of the Pennar, 107 miles N. of Madras. It was formerly an important fortress. In 1787 a pot filled with Roman gold coins and medals—chiefly of Trajan, Hadrian, and Faustina—was found under the ruins of a small Hindu temple here. Pop. 27,505.

Nelson, the capital of a provincial district in New Zealand, is situated at the north end of South Island, at the mouth of the Maitai, a small river at the head of Blind Bay. The situation is very beautiful, on a flat, hemmed in by rugged hills and amidst almost tropical luxuriance. The harbour is sheltered, and there is regular steam communication with Sydney and Melbourne. The city was founded in 1841, is now lighted with gas, and the

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water-supply is good. There is a cathedral, a literary institute, and museum, public hospital, and asylum. The manufactures of the town comprise cloth, leather, soap, and jam. Pop. (1889) 7733; with suburbs, over 10,000.

Nelson, HORATIO, VISCOUNT NELSON, English admiral, was born on 29th September 1758, at Burnham Thorpe in Norfolk, of which parish his father was rector. His mother, daughter of Dr Suckling, prebendary of Westminster, was related to the Walpoles. He entered the navy in 1770, under the patronage of his uncle, Captain Maurice Suckling; made a voyage to the West Indies in a merchant-ship; served in the Arctic expedition of 1773, and was afterwards sent to the East Indies in the *Seahorse*. Two years of the climate severely tried his constitution, never very strong, and he came home, invalided, in September 1776. In April 1777 he passed his examination, and by the interest of his mother's family was at once promoted to be lieutenant of the *Lowestoft* frigate, with Captain Locker. In her he went to Jamaica, where he was taken by the admiral into the flagship, and on 8th December 1778 was promoted to command the *Badger* brig, from which, six months later, he was posted to the *Hinchingbrook* frigate.

In January 1780 he commanded the naval force in the expedition against San Juan; in the heavy boat-work up the pestilential river his health broke down, and he returned to England in an apparently dying condition. A few months' rest and careful treatment, however, restored him; and in August 1781 he commissioned the *Albemarle*, in which, after a winter in the North Sea, he went to North America, where he joined the squadron under Lord Hood, and made the acquaintance of Prince William Henry, afterwards William IV., with whom he always maintained the most cordial relations. In the spring of 1784 he was appointed to the *Boreas* frigate, again for service in the West Indies, where, by enforcing the Navigation Act against the Americans, he roused the ill-will of the merchants, which took effect in numerous actions for damages. The law, however, was clear on the point, and Nelson's proceedings were sustained, though not without causing him much trouble and annoyance.

Whilst on this station he married Mrs Nisbet, the widow of a Dr Nisbet of Nevis, niece of Mr Herbert, the president of the island; and on the *Boreas* being paid off, in December 1787, he with his wife retired to Burnham Thorpe, where he lived for the next five years. His frequent applications for employment were unsuccessful, till, on the imminence of war with France in January 1793, he was appointed to the *Agamemnon* of sixty-four guns, in which he accompanied Lord Hood to the Mediterranean. When Toulon was given up to the allies Nelson was ordered to Naples to urge the necessity of troops being sent at once to their assistance; on his return he was employed in the blockade of Corsica, and in the following spring commanded the naval brigade which largely conduced to the reduction of Bastia and of Calvi, where an unlucky blow from a bit of gravel, scattered by a shot, destroyed the sight of his right eye. In 1795 he was with the fleet in the two actions fought by Admiral Hotham outside Toulon. In both the French were defeated with some loss, but they were allowed to escape, and Nelson in his private letters expressed an angry opinion that more might and ought to have been done.

In the autumn of 1795 Hotham was succeeded by Sir John Jervis, and during the whole of 1796 the strictest blockade of Toulon was enforced, Nelson being for the most part, as in preceding years, with a small squadron in the Gulf of Genoa, where he put a stop to all coasting traffic, and commanded the road along the shore so completely as to warrant his assertion that, had he had an adequate force, the invasion of Italy would have been impossible. Towards the close of the year Spain concluded a treaty of alliance with France, and sent her fleet into the Mediterranean to co-operate with the French. Jervis thus found himself opposed by very superior forces; and, with Spain and Italy both in hostile hands, his position was no longer tenable. He withdrew the troops from Corsica, and retired to Gibraltar, and afterwards to Lisbon. He was, however, determined that the Spanish fleet, which had been instructed to join the French at Brest, should not pass; and, on its endeavouring to do so, met it off Cape St Vincent on 14th February 1797, and inflicted on it a signal defeat. This was rendered more decisive by the action of Nelson, who, having been appointed commodore, with his broad pennant on board the *Captain*, was in the rear of the line, and, interpreting a manœuvre of the Spanish admiral as an attempt to reunite the two divisions of his fleet, which Jervis had separated, wore out of the line to meet him, and for nearly half an hour withstood, single-handed, the attack of the whole Spanish van. When support arrived and the Spaniards fled, the *Captain* had suffered severely; and Nelson, being unable to join in the pursuit, let his ship fall foul of the Spanish *San Nicolas*, which he boarded and took possession of, and, leading his men across her deck to the *San Josef*, took possession of her also.

Nelson's conduct on this occasion deservedly won for him the cross of the Bath; and, being promoted in due course to be rear-admiral, he continued with the fleet off Cadiz till, in July 1797, he was sent with a small squadron to seize a richly-laden Spanish ship which had taken refuge at Santa Cruz. He was instructed to levy a heavy contribution on the town if the treasure was not given up; but the troops which he had asked for were not granted, the ships were powerless, and the landing force at his disposal was quite inadequate. With it, such as it was, however, the attack was made on the night of 21st July; but in the darkness the boats missed the mole, and landing irregularly were repulsed with severe loss. Nelson himself had his right elbow shattered by a grape-shot. He was carried on board his ship, where the arm was amputated, but on rejoining the fleet he was compelled to return to England.

In the following March, 1798, he hoisted his flag on board the *Vanguard* of seventy-four guns, and sailed from St Helens to rejoin the fleet off Cadiz. He was immediately sent into the Mediterranean in command of a small squadron, with orders to ascertain the object of the French armament at Toulon. The secret was, however, too well kept; and the *Vanguard*, being dismasted in a violent gale, was obliged to put into San Pietro off Sardinia to refit, while the French expedition sailed on its way to Egypt. On 7th June Nelson was reinforced by ten sail of the line; but his frigates had all parted company, and, under some misapprehension of orders, did not rejoin him. He was thus left without means of learning anything about the French further than that they had sailed from Toulon. His hope to get news at Naples proved vain, and it was only when he arrived off Messina that he heard that the French had captured Malta, but had sailed again some days before. Their destination was unknown; he conjectured that it might be Egypt, and he hastened thither, only to find that there was no trace of them. He had in fact passed within a few leagues of them, but without seeing them. He returned by the coast of Asia, put into Syracuse, where he

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watered, and was meditating going up the Archipelago to Constantinople, when he at last learned that, after all, they had gone to Egypt. Thither he immediately followed, and on the evening of 1st August found their fleet lying at anchor in Aboukir Bay. His plans had long before been formed and discussed with the several captains under his orders, everything was ready, and no explanatory signals were needed. His fleet was numerically inferior to that of the French, and became still more so by the accident of the *Culloden* getting aground and being unable to take any part in the battle; but the wind was blowing along the French line, and, by concentrating his attack on the weather end of it, it was crushed by superior force, while the leeward-most ships were unable to render any assistance; and thus, creeping gradually down the line, he captured or destroyed the whole, with the exception of the two rear-most ships, and two of the frigates, which fled.

Never, in recent times, had there been a victory so complete, so overwhelming; and when Nelson with his shattered fleet returned to Naples he was the object of an enthusiastic adoration which knew no bounds. The queen, in her intense hatred of the murderers of her sister, welcomed their conqueror with all the ardour of a passionate nature, and Lady Hamilton (q.v.), the wife of the English ambassador, fell on his breast in a paroxysm of hysterical rapture. A woman of extreme beauty, winning manners, and shady antecedents, first the mistress and then the wife of Sir William Hamilton, she enslaved Nelson by her charms, and the two became bound by a liaison which death only severed. At home Nelson was raised to the peerage by the title of Baron Nelson of the Nile; parliament voted him a pension of £2000 a year, and the East India Company awarded him a sum of £10,000. Turkey and Russia sent him handsome and costly presents, and the king of Naples conferred on him the title of Duke of Bronte, in Sicily, with an estate valued at £3000 a year, though during Nelson's life its revenues seem to have been in abeyance.

The government of Naples had already concluded an alliance with Austria and declared war against France; but the French army swept away the Neapolitan troops almost without resistance, and the Neapolitan Jacobins received their French brethren with open arms. For the king and his court safety was only in flight, and Nelson conducted them to Palermo. Afterwards, returning as the king's representative, he sternly annulled the convention which Cardinal Ruffo, contrary to the king's express orders, had made with the rebels; he forced the traitors to surrender at discretion, and he promptly hanged Caracciolo (q.v.), one of their leaders, who had added perjury to treason, and having accepted a command as commodore in the king's navy had betrayed his trust, and waged war against the authority he was pledged to maintain.

The affairs of Naples were not yet regulated, the outposts held by the French and their sympathisers were not yet all reduced, when, on July 19, 1799, Nelson received an order from Lord Keith, the commander-in-chief in the Mediterranean, to bring or send the greater part of his force to Minorca, which he conceived to be threatened by a joint attack of France and Spain. Nelson refused to obey the order; and when it was repeated in still more positive terms, he contented himself with sending Sir John Duckworth, his second in command, while he himself remained at Naples or Palermo, and controlled the blockade of Malta which was carried on unremittingly during the whole time. The Admiralty censured him for his disobedience; and indeed it can scarcely be maintained that the affairs of Naples were of such paramount importance as to justify this extraordinary breach of discipline, the motives of which have been much discussed. Perhaps the true explanation of his conduct is that a severe wound in the head, which he had received at the Nile, had seriously affected his general health, and caused a depression of spirits which it needed some violent stimulus to overcome. Happy at last in the capture of the two ships which had escaped from Aboukir Bay, he obtained leave to resign his command, which the state of his health rendered irksome, and made his way home overland, by way of Vienna and Dresden, in company with Lady Hamilton and her husband, for whom he professed and appears to have truly entertained a real affection and esteem. He arrived in England in November 1800. The four months spent on the journey had done much to re-establish his health, and he immediately volunteered for active service. His meeting with his wife could not possibly be a happy one; and after an angry interview they parted never to see each other again.

On 1st January 1801 Nelson was promoted to be vice-admiral, and a few days later was appointed second in command of the expedition ordered to the Baltic, under Sir Hyde Parker. He hoisted his flag in the *St George*, but that ship being too large for the approaches to Copenhagen, he moved into the *Elephant* when the attack was determined on. The whole conduct of this attack was entrusted to Nelson, with the smaller ships of the fleet, Parker, with the others, remaining at anchor some miles distant. After a furious combat of from three to four hours' duration, the enemy's ships were subdued. The shore batteries still continued to fire, till Nelson sent a flag of truce on shore to point out that the worst sufferers from the continued engagement were the crews of the beaten ships, which received a great part of the fire of both parties. A suspension of hostilities was agreed on to permit of the prisoners being removed; and this led to an armistice, which the news of the czar's death shortly afterwards converted into a peace. Nelson, who was raised a step in the peerage and became a viscount, succeeded Parker as commander-in-chief; but, his health having given way, he was permitted to return to England. He arrived in the beginning of July, and was at once ordered to undertake the defence of the coast, in view of the preparations for invasion which were being made in France; and though he failed in an attempt to destroy the flotilla collected in Boulogne, his watch was so vigilant that the boats never ventured from under the protection of their chains and batteries.

On the renewal of the war Nelson was at once sent out to the Mediterranean, where, with his flag in the *Victory*, he cruised for more than eighteen months in front of Toulon, drawing back occasionally to Madalena for water and refreshment. During one of these absences, in March 1805, the French fleet put to sea under the command of Vice-admiral Villeneuve, and got clear away to Gibraltar, to Cadiz, and to Martinique, where they expected to be joined by the fleet from Brest. Nelson, however, though delayed for six weeks by his ignorance of where Villeneuve had gone, was only twenty days behind him; and Villeneuve, deceived as to the English numbers, and unwilling to risk an engagement which might frustrate his ulterior object, hastily returned to Europe. Nelson again followed, again outsailed his enemy, and arrived off Cadiz some days before the French approached the shores of Europe. Then, conceiving that Villeneuve's aim might be to overpower the fleet off Brest, he went north and reinforced it with most of his ships, returning himself to England. It was but for a few weeks. Within a

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fortnight it was known that Villeneuve had gone to Cadiz, and Nelson was ordered to resume the command. He did so on 25th September, and for the next month kept a close watch on the port, while his fleet was being gradually increased in numbers. He was especially desirous that he should have sufficient force. What he wanted was not merely an honourable victory gained by an inferior fleet, but the annihilation of the enemy. Villeneuve was meantime urged by positive and repeated orders to put to sea, and on 20th October, having learned that some of the English ships had gone to Gibraltar, he reluctantly came out. Of French and Spanish ships combined there were with him thirty-three; with Nelson there were twenty-seven.

At daybreak on the 21st the two fleets were in presence of each other off Cape Trafalgar, and Nelson, who several days before had given out and explained his plan of attack, at once made the signal to bear up towards the enemy. The wind was very light, and it was noon before the lee division of the fleet, under Collingwood in the *Royal Sovereign*, broke through the rear of the Franco-Spanish line. Nelson, with the other division, had reserved to himself the duty of overawing the van, till, convinced that they had no immediate intention of turning to support their rear, he bore up and threw himself on their centre. As the *Victory* passed astern of Villeneuve's flagship, she fell foul of the *Redoutable* of seventy-four guns, and her quarter-deck became exposed to the musketry fire from the *Redoutable's* tops. Nelson, while standing speaking to Captain Hardy, fell mortally wounded by a shot on the left shoulder, which, striking obliquely downwards, passed through the spine. He was carried below, and died some three hours later, just as the battle ended in the decisive victory of the English. The enemy's fleet was annihilated.

Nelson's body was brought home, and, after lying in state at Greenwich, was interred with much pomp in the crypt of St Paul's. In the cathedral above a gorgeous monument has been erected to his memory, and numerous others throughout the land bear witness to the deep feeling which his splendid services awakened.

His Life by Clarke and M'Arthur (2 vols. 1809) is written with more credulity than critical accuracy. Southey's famous Life (2 vols.) dates from 1828. The best record of Nelson's services is his *Dispatches and Letters*, edited by Sir N. Harris Nicolas (7 vols. 8vo, 1844–46); there is a selection from the *Letters and Dispatches* by the author of the present article (1886). His relations with the queen of Naples and Lady Hamilton are related in very full detail in J. C. Jeaffreson's *The Queen of Naples and Lord Nelson* (2 vols. 1889), and *Lady Hamilton and Lord Nelson* (2 vols. 1888).

Nelson, ROBERT, was born in London on 22d June 1656, a rich Turkey merchant's son, and, after a brief space at St Paul's school, removed with his widowed mother to Dryfield in Gloucestershire, where he was brought up by Dr George Bull. In 1680, the year of his election to the Royal Society, he set out with Halley on a twenty months' tour in France and Italy, returning from Italy with Lady Theophila Lucy (1654–1705), a widow, and daughter to the Earl of Berkeley, who in 1683 became his wife, and who soon after was converted to Catholicism by Cardinal Howard and Bossuet. Her ill-health had taken them again to Italy at the time of the Revolution; but Nelson was from the first a (passive) Jacobite, and on his return to England in 1691 he joined the Nonjurors. He was received back into the Established Church in 1710, though he still would not join in the prayers for Queen Anne; and he died at Kensington on 16th January 1714. A man whose whole life was devoted to doing good, one of the earliest members of both the S.P.C.K. and S.P.G., the 'pious' Robert Nelson was the author of five devotional works, of one of which, the *Festivals and Fasts* (1703), 10,000 copies were sold in four and a half years.

See the Lives by W. H. Teale (2 vols. 1840–46) and C. F. Secretan (1860); also Abbey's *English Church in the Eighteenth Century* (new ed. 1887).

Nelson River issues from the north end of Lake Winnipeg in Canada, and, after a north-easterly course of 400 miles through Keewatin, falls into Hudson Bay. It discharges an enormous quantity of water, and is navigable for 127 miles from its mouth, though only some 70 or 80 miles for large steamers. For the railway from Winnipeg, see HUDSON BAY.

Nelumbo (*Nelumbium*), a genus of aquatic plants included by some botanists in the natural order Nymphæaceæ (q.v.); but by others constituted into an order, Nelumbiaceæ, differing in the want of albumen in the seed, and in the distinct carpels, which are buried in the cavities of a large fleshy receptacle. The flowers and leaves are very similar to those of water-lilies. The species are few, and are found in the warm parts of Asia, in the north of Africa, and in North America. They are all distinguished by the beauty of their flowers. *N. speciosum* is the Egyptian Bean of Pythagoras, the *Lotus* and *Tamara* of the Hindus, and the *Lien-Hoa* of the Chinese. By the ancients it was regarded as the emblem of fertility; with it the Egyptians decorated the heads of their idols Isis and Osiris. The Hindus hold it sacred, and with them it is the floating shell of Vishnu and the throne of Brahma. The Tibetans embellished their temples and altars with it. It is also much esteemed and cultivated in China and elsewhere in the East for its seeds, roots, leaf-stalks, and flower-stalks, all of which are eaten. It has been used as food by the Egyptians from remote antiquity. The seeds are in size and shape like acorns, with a taste more delicate than that of almonds. The root contains much starch, and a kind of arrowroot may be obtained from it; and powdered it makes excellent soup with milk or water. Great quantities are pickled with salt and vinegar, and eaten with rice. The flowers are generally rose-coloured, seldom white. The ancient Egyptian mode of sowing this plant, by enclosing each seed in a ball of clay and throwing it into the water, is practised at the present day in India.—*N. luteum* is a North American species, with yellow flowers, extending almost as far north as Philadelphia. The farinaceous roots are agreeable when boiled.

Nelumbium luteum.

Nemathelmia, or NEMATHELMINTHES (Gr. *nēma*, 'a thread,' and *helmins*, 'an intestinal worm'), a general name applied to the thread-worms or nematodes, such as *Ascaris* (q.v.), *Guinea-worm* (q.v.), *Trichina* (q.v.), to the somewhat distinct

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Gordiidæ or *hair-eels*, and to the more remotely allied Acanthocephala or *Echinorhynchus* (q.v.).

Nematodes. See THREADWORMS, PARASITIC ANIMALS.

Nemea, anciently the name of a deep and well-watered valley of Argolis, in the Peloponnesus, between Cleonæ and Phlius. It lies north and south, and is from two to three miles long and more than half a mile broad. It possessed a sacred grove, with a magnificent temple of Zeus, and was celebrated for the games called the *Nemean Games*, one of the great national festivals of the Greeks. See ATHLETICS.

Nemertea, an important class of 'worms,' the members of which are mostly marine. They are unsegmented, covered with cilia, and often brightly coloured. Their habitat is usually in sand or mud, but many are able to swim, while a few are parasitic. In diet they seem to be mainly, if not wholly, carnivorous. The body is very extensile, and in *Lineus maximus* may measure 15 feet in length. Most of them break readily and even spontaneously, the fragments being in some cases able to form a fresh head and body. Among their remarkable characters may be noted the presence of a long protrusible offensive proboscis which lies quite apart from the gut in a special sheath along the back, and the occurrence of two curious ciliated pits, perhaps respiratory in function, opening on the sides of the head, and sometimes reaching as far inwards as the brain. Two nerve cords extend from the brain along the sides of the body, occasionally approaching one another ventrally or even dorsally. The sexes are separate, and there is frequently a remarkable metamorphosis in development. According to Professor Hubrecht, the nemerteans exhibit in the proboscis, its sheath, and the two head-slits distinct affinities with vertebrates.

Nemesis, according to Hesiod, the daughter of Night, was originally the personification of the moral feeling of right and a just horror of criminal actions—in other words, of the conscience. Afterwards, when an enlarged experience convinced men that a divine will found room for its activity amid the little occurrences of human life, Nemesis came to be regarded as the power who constantly preserves or restores the moral equilibrium of earthly affairs—preventing mortals from reaching that excessive prosperity which would lead them to forget the reverence due to the immortal gods, or visiting them with wholesome calamities in the midst of their happiness. Hence originated the latest and loftiest conception of Nemesis, as the being to whom was entrusted the execution of the decrees of a strict retributive providence—the awful and mysterious avenger of wrong, who punishes and humbles haughty evil-doers in particular. Nemesis was thus regarded as allied to Até (q.v.) and the Eumenides (q.v.). She was represented in the older times as a young virgin, resembling Venus; in later times, as clothed with the tunic and peplus, sometimes with swords in her hands and a wheel at her foot, a griffin also having his right paw upon the wheel; sometimes in a chariot drawn by griffins. There was a famous temple of Nemesis at Rhamnus in Africa, where important fragments of the statue of Nemesis by Phidias were discovered in 1890.

Nemi, LAKE OF, an extinct crater, 20 miles S. of Rome, accounted for its beauty the gem of the Alban Mountains. There was here a famous temple of Diana, portions of which have been recently excavated. Renan's *Prêtre de Nemi* (1885) gives the place additional interest.

Nemophila, a genus of herbaceous annuals belonging to the Hydrophyllaceæ, with pinnatifid leaves and conspicuous flowers. Natives of North America, they are cultivated in European gardens, the *N. insignis* being prized as a border plant on account of its showy flowers, blue with a white centre. Other species are *N. atomaria* and *N. maculata*.

Nemours, an ancient town of 4268 inhabitants in the French department of Seine-et-Marne, 40 miles SE. of Paris by rail, gives a ducal title to the second son of Louis-Philippe, born in 1814.

Nenagh, a market-town of County Tipperary, 28 miles NE. of Limerick by rail. The ancient Norman keep, called Nenagh Round, is a striking object. Pop. 5422.

Nennius, the reputed author of a *Historia Britonum*, evidently of Cymric origin. It gives the mythical account of the origin of the Britons, the Roman occupation, the settlement of the Saxons, and closes with the twelve victorious battles of King Arthur. The writer is extremely credulous and feeble in judgment, but he has preserved valuable fragments of earlier treatises. The name of Nennius occurs in two prologues extant, but these are suspiciously superior in style to the poor Latinity of the history itself. The text was edited by the Rev. Joseph Stevenson for the English Historical Society in 1838. See the criticism in De la Borderie's *L'Historia Britonum* (Paris, 1883), besides works by Skene and Rhys.

Neocomian. See CRETACEOUS SYSTEM.

Neolithic. See FLINT IMPLEMENTS.

Neophyte (Gr. *neophutos*, from *neos*, 'new,' and *phuō*, 'I grow'), the name given in early ecclesiastical language to persons recently converted to Christianity. The word is used in this sense by St Paul (1 Tim. iii. 6). The name neophyte is also applied in Roman usage to newly-ordained priests, and sometimes, though more rarely, to the novices of a religious order.

Neoplatonism, the last form of Hellenic philosophy, the system of an illustrious succession of ancient philosophers who claimed to found their doctrines and speculations on those of Plato. Strictly speaking, however, the Platonic philosophy expired with Plato's immediate disciples, Speusippus and Xenocrates. Neoplatonism is an attempt to combine Plato's doctrine of the Ideas, developed by Aristotle, and supplemented with an ethical system akin to that of the Stoics, with the oriental doctrine of Emanation; it does for Hellenism something like what Philo did for Judaism. Such amalgamation came about most naturally in Alexandria. Placed at the junction of two continents, Asia and Africa, and close to the most cultivated and intellectual regions of Europe, that celebrated city naturally became a focus for the chief religions and philosophies of the ancient world. Here the East and the West, Greek culture and oriental enthusiasm, met and mingled; and here Christianity sought a home, and by the liberality of its sympathies strove to quell the myriad discords of Paganism.

Authorities have differed as to how much should be included under the term Neoplatonism. By some it is used to designate the whole new intellectual movement proceeding from Alexandria, comprising, in this broad view, the philosophy of Philo-Judæus and of Numenius the Syrian; of Christian Fathers like Clemens Alexandrinus and Origen; of the Gnostics; and of Ammonius Saccas and his successors. But the best authorities restrict the application of the term to the fourth of these series. Plotinus, its real founder, resuscitated Plato; Proclus gave the world another Aristotle; in the person of Julian the Apostate Neoplatonism became master of the world, and for three centuries it was a formidable rival to Christianity. The

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Neoplatonists aimed at constructing a religion on a basis of dialectics. They strove to attain a knowledge of the Highest, and the way in which they endeavoured to accomplish this was by assuming the existence of a capacity in man for passing beyond the limit of his empirical knowledge, and acquiring an intuitive knowledge of the absolute, the true—that which is beyond and above the fluctuations and dubieties of 'opinion.' This impersonal faculty is called *Ecstasy*. By means of it man—ceasing, however, to be individual man—can identify himself with the Absolute (or Infinite). Plotinus, in fact, set out from the belief that 'philosophy' is only possible through the identity of the thinker, or rather of the subjective thought, with the thing thought of, or the objective thought. This intuitive grasp or 'vision' of the Absolute is not constant; we can neither force nor retain it by an effort of will; it springs from a divine inspiration and enthusiasm higher and purer than that of poet or prophet, and is the choicest 'gift of God.'

The god of Plotinus and the other Alexandrians is a mystical Trinity. The Divine Nature contains within it three Hypostases (Substances); its basis, if we may so speak, is Unity or Primitive Light. This Unity is not itself any *thing*, but the principle of all things; it is absolute good, absolute perfection; and, though it is utterly incapable of being conceived by the understanding, there is that in man which assures him that it—the incomprehensible, the ineffable—*is*. From Unity, as the primordial source of all things, emanates Pure Intelligence (*Nous*), its reflection and image, that by which it is intuitively apprehended; from Pure Intelligence, in turn, emanates the 'Soul of the World,' whose creative activity produces the souls of men and animals, and 'Nature;' and finally, from Nature proceeds 'Matter,' which, however, is subjected by Plotinus to such refinement of definition that it loses all its grossness—though he is no dualist, and glories in the beauty of the world. Unity, Pure Intelligence, and the World-Soul thus constitute the Plotinian Triad, with which is connected, as we have seen, the doctrine of an eternal Emanation. Human souls, whose source is the Pure Intelligence, are—by some mysterious fate—imprisoned here in perishable bodies, and the higher sort are ever striving to reascend to their original home.

The most distinguished pupil of Plotinus was Porphyry, who mainly devoted himself to expounding and qualifying the philosophy of his master. In him we see for the first time the presence of a distinctively anti-Christian tendency. Neoplatonism, which can only be properly understood when we regard it as an attempt to place Paganism on a philosophical basis—to make the Greek religion philosophical, and Greek philosophy religious—did not *consciously* set out as the antagonist of Christianity. Neither Ammonius Saccas nor Plotinus assailed the new faith; but as the latter continued to grow, and to attract many of the most powerful intellects of the age into its service, this latent antipathy began to show itself. Porphyry wrote against Christianity; Iamblichus, the most noted of his pupils, did the same. The latter also introduced a theurgic or 'magical' element into Neoplatonism, teaching, among other things, that certain mystical exercises and symbols exercised a supernatural influence over the divinities. Magic and spiritualism are always popular, and it is therefore not wonderful that Iamblichus should have had numerous followers. Ædesius succeeded to his master's chair. From the school of one of his disciples, Maximus, came the Emperor Julian, whose patronage for a moment shed a gleam of splendour over Neoplatonism, and seemed to promise it a universal victory.

After a succession of able but not always consistent teachers, among whom is to be reckoned the noble Hypatia, we reach Proclus, the last great Neoplatonist, who belongs to the 5th century, a man of prodigious learning, and of an enthusiastic temperament, in whom the pagan-religious, and consequently anti-Christian, tendency of the Neoplatonic philosophy culminated. His ontology was based on the Triad of Plotinus, but was considerably modified in detail; he exalted 'Faith' above 'Science' as a means of reaching the Absolute Unity; was a believer in Theurgy, and so naturally laid great stress upon the ancient Chaldæan oracles, Orphic hymns, mysteries, &c., which he regarded as divine revelations, and of which he considered himself—as, indeed, he was—the last great 'interpreter.' His hostility to the Christian religion was keen; in its success he saw only the triumph of a vulgar popular superstition over the refined and beautiful theories of philosophy; it was as if he beheld a horde of barbarians defacing the statues and records of the Pantheon. The disciples of Proclus were numerous, but not remarkable for talent. Perhaps the ablest of his successors was Damascius, in whose time the Emperor Justinian, by an arbitrary decree, closed the schools of the heathen philosophers. Neoplatonism soon ceased to exist as a system; but it served as a schoolmaster to bring the mediæval thinkers to Plato and Aristotle, it served as the nurse of Christian mysticism, and it had helped to mould the mind of Augustine. From a scientific point of view it was retrogressive, perverse, absurd; yet in the moral and religious sphere it maintained a high and holy ideal, and fostered a firm belief in that which is above the empirical.

See Zeller's *History of Greek Philosophy;* Ueberweg and the other historians of philosophy; Herzog-Plitt's *Realencyklopädie;* the church histories; Kingsley's *Alexandria and her Schools*, and his *Hypatia;* Bigg's *Christian Platonists of Alexandria* (1885); Simon, *Histoire de l'École d'Alexandrie* (1845); Vacherot, *Histoire critique de l'École d'Alexandrie* (1851); and the articles in this work on PLATO, STOICISM, PHILO, ORIGEN, GNOSTICS, PLOTINUS, PORPHYRY, IAMBLICHUS, PROCLUS.

Neo-Pythagoreanism stood to Pythagoras somewhat as Neoplatonism did to Plato, and was an Alexandrian development under oriental influences. It originated in the first half of the century before Christ, and was accordingly the predecessor of Neoplatonism. Neo-Pythagoreans may be divided into two groups, according as their aims were mainly practical—the purification and ennobling of life by asceticism, including theurgy, or more modestly metaphysical—basing their views on the Pythagorean theory of numbers (see PYTHAGORAS). Of the former school Apollonius (q.v.) of Tyana is the most conspicuous example; of the latter, Moderatus of Gades, Nicomachus of Gerasa (2d century A.D.), Archytas (q.v.), and Sextius. See the works cited at NEOPLATONISM.

Neozoic (Gr., 'new life'), a term introduced by Edward Forbes to include all the strata from the Trias to the most recent deposits. Few geologists have adopted the term; the systems in question being generally divided into the groups of Secondary or Mesozoic, Tertiary or Cainozoic, and Quaternary or Post-Tertiary.

Nepal, an independent kingdom of India, lying on the southern face of the Himalayas, is bounded on the N. by Tibet, on the S. and W. by Bengal, and on the E. by Sikkim, a protected state. Long. 80° 6′—88° 14′ E. It is 512 miles in length, by 70 to 150 in breadth. Area, 54,000 sq. m.; pop. estimated by native authorities at more than 5,500,000, though probably half that number is nearer the mark. The northern parts of the state embrace the main range of the Himalayas (q.v.),

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with its offset spurs, on which stand the great peaks of Everest, Diwalagiri, &c. On the south of the state lies the Terai. The intervening territory consists of mountain-ridges, embracing several valleys drained by the Kurnali, Gandak, Kosi, and other rivers. The climate of course varies greatly according to the altitude; the principal valley, in which stands the capital Khatmandu (q.v.), has a climate like that of southern Europe. The soil is very fertile, in some districts producing three crops in the year. The hillsides are terraced and the land is irrigated. Rice, opium, rape, linseed, tobacco, and various cereals and pulses are the more important products. Several minerals, as copper, iron, sulphur, and others exist, but are little worked. The forests contain valuable timber trees. Nepal has extensive trading relations with the provinces of British India, reaching the annual average value of £2,000,000, and with Tibet, the details of which are not known. The valleys are inhabited by numerous different hill-tribes, partly aboriginal, partly of Mongolian or Chinese descent; but the dominant race are the Goorkhas (q.v.), whose ancestors came to the Himalayan slopes from Rajputana in the 12th century, though it was not until 1769 that they made themselves masters of Nepal. They rapidly subdued the hill-valleys to east and west of them, and, after a war with China (1789–92), on account of Tibet, in which the Goorkhas were worsted, and a period of great internal disorder, Nepal came into conflict with the Indian government. War followed; in 1815 Sir David Ochterlony defeated the Goorkha armies in the west, and peace was agreed to; but, the treaty not having been signed by the king of Nepal, a British force, 33,000 strong, advanced in the succeeding year to within three days' march of Khatmandu, and compelled the Goorkhas to sign the treaty. Since that they have ceased their encroachments on British territory, and during the Mutiny voluntarily sent to the assistance of the British a force which rendered useful service in the reduction of Oudh. The real ruler of the country is the prime-minister; Sir Jang Bahadur held this office from 1846 to his death in 1877, and was succeeded by his son. But he was slain and supplanted by the head of a rival faction in 1885.

Nepenthes. See INSECTIVOROUS PLANTS.

Nepheline (Gr. *nephelē*, 'a cloud;' in allusion to the mineral becoming cloudy when immersed in a strong acid), a rock-forming mineral of some importance. It is colourless, white or yellowish, and usually crystallises in hexagonal prisms with various modifications. It has a hardness of 5½ to 6, and sp. gr. of 2½ or thereabouts. It occurs in various volcanic rocks, as in certain basalts (nepheline-basalts), in which it plays the part of felspar in ordinary basalt (plagioclase-basalt). In these fine-grained rocks the crystalline granules of nepheline are of microscopic size; in the more coarsely crystalline nepheline-basalts (nephelinites) the crystals are readily seen by the naked eye. Fine crystals often occur in drusy cavities in such rocks. Elæolite (Gr. *elaion*, 'oil') is a variety of nepheline with a greasy lustre, which seldom assumes a crystalline form. It is dark greenish, gray, or brown in colour, and appears to occur only in plutonic rocks, as in the syenites of Frederiksvärn and Laurvig in Norway.

Nephelium. See LITCHI.

Nephrite, a mineral usually called Jade (q.v.), and known also as Beilstein, or Axestone. It is a hard, tough mineral found in Turkestan, in Siberia, in Bhutan, in New Caledonia, in the Marquesas, in British Columbia, and in Alaska. It is a composition of silicate of calcium and magnesium, with lime, alumina, sodium, and protoxide of iron. The bright green of some of the more highly-prized specimens is probably due to oxide of nickel. Some specimens in India (where it is not native) strike fire with steel, and are therefore not pure nephrite. What is most generally known as oriental jade is a pale-greenish nephrite, more or less opaque, very hard, but with a peculiar greasy feeling to the touch. This quality is more often seen in vases, &c., the finer and rarer colours being used for personal ornaments. Much of what is called Oceanic jade, because found in the South Sea Islands and New Zealand, is not true nephrite, but is nevertheless a beautiful and valuable mineral. Nephrite (Greek *nephros*, 'kidney') was supposed to be a charm against nephritic diseases, and had many other virtues ascribed to it; in China to this day jade ornaments are believed to afford protection from lightning. The old Aryan belief in this may account for the wide distribution of jade ornaments although deposits of the mineral are so limited. The specimens of nephrite obtained from prehistoric 'finds' in Europe were believed to have been imported from Asia. But recently the mineral has been discovered in place at Jordansmühl in Silesia; and the water-worn fragments found at Neuenburger See have probably been derived from some local source not yet detected.

Nephritis (Gr. *nephros*, 'kidney'), inflammation of the Kidneys (q.v.).

Nepomuk (or POMUK), JOHN OF, the patron saint of Bohemia, who is honoured as a martyr of the seal of confession, was born at Pomuk, a few miles SE. from Pilsen, about 1330. Having studied at the university of Prague and taken holy orders, he held various ecclesiastical offices in Prague, and was appointed confessor to Sophia, wife of King Wenceslaus IV. For refusing to betray to this monarch the confession of the queen John was put to the torture, then tied hand and foot, and flung into the Moldau, in March 1383. His memory was cherished with peculiar affection by the Bohemian people, and in 1729 he was canonised by Pope Benedict XIII. His memory is celebrated on 16th May. By some historians two distinct personages of the same name are enumerated—one, the martyr of the confessional, the other, a victim to the simoniacal tyranny of Wenceslaus; but the identity of the two is sustained by Palacky, *Geschichte von Böhmen*, iii. 62. In 1855 Abel tried to prove that John of Nepomuk was a merely Catholic transformation of the people's darling, the heretical John Huss. See Wratislaw's *Life, Legend, and Canonisation of St John Nepomucen* (1873).

Nepos, CORNELIUS, a Roman historical writer, was a native of Pavia, as Mommsen thinks, of Hostilia (now Ostiglia), as its citizens believed they proved by erecting a statue in 1868. He was the contemporary and friend of Cicero, Atticus, and Catullus, and was probably still alive in 25 or 24 B.C. The ancients ascribed to him the following works: *Chronica, Exemplorum Libri*, Lives of Cato and Cicero, and *De Viris Illustribus*. The last is supposed to have consisted of sixteen books, but only twenty-five brief biographies of warriors and statesmen, mostly Greeks, have survived. These biographies are untrustworthy as history, but are written in a clear and elegant style, although affected archaisms and euphuistic mannerisms are not unfrequent. Until the middle of the 16th century they were generally ascribed to Æmilius Probus (4th century); but in 1569 the famous Dionysius Lambinus claimed them as part of the lost work of Cornelius Nepos. Other good editions are those of Cellarius (1689) and, in modern days, Nipperdey (2d ed. 1879). See Freudenberg, *Quæstiones historicæ in C. Nepotis vitas* (1839).

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Nepotism (Ital. *nepote*, 'a nephew'), a word used to signify the system or custom practised by several popes subsequent to Innocent VIII. of granting high honours, dignities, offices, pensions, and the like to their family relations, generally their nephews, altogether irrespective of merit.

Neptune, the Italian god of the sea. Attempts have been made to show that his worship goes back to Aryan times, by identifying his name with the Sanskrit and Iranian Apâm Napât, 'offspring of the water.' But this is one of those unfortunate identifications which show that comparative mythologists are not always comparative philologists. Further, as there is nothing whatever to make it in the least probable that Neptune was ever anything but a sea-god, and as the primitive Aryans were not acquainted with the sea, it is evident that he cannot have been an Aryan deity. Indeed, as it was not until after the Italians had entered Italy that they became at all familiar with the sea, it was probably not until after they had settled in Italy that they made acquaintance with Neptune. Nor in all probability was he their own invention. We may conjecture that he was borrowed by them from the Etruscans, a maritime nation, who worshipped as their sea-god Nethuns or Nethunus. Had the Italians never come in contact in historical times with the Greeks, Nethunus or Neptunus would have remained a mere abstraction, like all other Italian deities, who were rather *numina* than personal beings. But communication with Greece resulted in the Italians identifying their god of the sea with Poseidon (q.v.), the Greeks' god of the sea.—For the planet Neptune, see PLANETS; for the Neptunist theory, see GEOLOGY, Vol. V. p. 148.

Nerbudda (more correctly NARBADA), a river of India, rises on the Amarkantak plateau, 3493 feet above sea-level, in 22° 41′ N. lat., 81° 49′ E. long., and flows west, through the Central Provinces, past Jabalpur (190 miles from its source), through the great depression between the Vindhya Mountains on the north and the Satpura Mountains on the south, known as the Valley of the Nerbudda, and reaches the Gulf of Cambay half-way between Baroda and Surat. It has a total length of 800 miles, and drains 36,400 sq. m. It is navigable as far as Broach, 30 miles from its mouth, and is joined from the left by the Kaveri (Cauvery). The river ranks as a sacred stream in the eyes of the Hindus. It is regarded as a meritorious act to walk from the sea to its source and back again alongside the river.

Nerchinsk. See NERTCHINSK.

Nereid. See NYMPH.

Nereis, a common genus of marine worms or Chætopods, the members of which live in the sand or more freely in the sea. See CHÆTOPODS, and WORMS.

Neri, PHILIP, the founder of the Congregation of the Oratory and a canonised saint of the Roman Catholic Church, was born at Florence, July 21, 1515, and was the youngest son of Francesco Neri, an attorney in that city. His singular modesty, his piety, and affectionate heart won for him in his boyhood the name of the 'Good Pippo.' Philip's uncle, a prosperous merchant, wished to make him his heir; but the youth, with the view of abandoning all worldly pursuits, left his family and betook himself in his eighteenth year to Rome. Here for many years he lived as a layman a humble and retired life. A Florentine gentleman gave him a small room as a lodging and a daily allowance of meal. Philip spent most of his time in visiting the sick, in instructing the poor and ignorant, and in solitary prayer in the catacombs. It was not till 1551, when he was thirty-six years of age, that he was persuaded to become a priest. He now took up his quarters in the little church of S. Girolamo, and gathering round him a number of disciples, some of whom were men of good family and high attainments, he started the exercises of devotion which made his name famous. At first these simple services or prayer-meetings were held with a few young men in his own room. In 1558 they were transferred to an oratory which he was permitted to build over the nave of the church. These daily services, which were a great novelty at the time, consisted of three sermons of about half an hour's duration, delivered in a familiar style, and interspersed with vernacular hymns, reading, and prayers. The preachers were for the most part laymen. During the day Philip took many of his penitents round the hospitals. His object was to make religion attractive, especially to the young. At the carnival or in holiday seasons he instituted musical entertainments and the acting of religious dramas, the origin of the modern oratorio. At other times he took numbers of men in procession through the streets on a pilgrimage to the seven churches, alternately singing hymns and praying in silence, and would take refreshment and recreation in the vineyard or garden of some wealthy friend. It is said that before Philip's death the number of these pilgrims rose to two thousand.

In 1564 Philip had some of his companions ordained priests, and established among them a community life at a church given to him by the Florentines. One of these priests was Cesare Baronio, the historian of the church, and afterwards cardinal. Ten years later the community, now much increased in number, moved to S. Maria in Vallicella, on the site of which Philip built a larger church, known as the Chiesa Nuova, or New Church. Here the institute of the Oratory received the formal approbation of the pope, and here Philip died, May 25, 1595.

The saint was not an orator or a learned man, and although he was the favourite of popes and cardinals, as he was of the poor, he never received any ecclesiastical office or dignity. He never meddled with politics or public affairs. But his gentle and joyous nature, his tender charity, and the example of his innocent life were among the most potent of the influences which brought about the revival of ecclesiastical piety and the reformation of morals in Rome during the later half of the 16th century, and which earned for him his title of 'the Apostle of Rome.' Many miracles were attributed to the saint, even the raising of the dead. A notable phenomenon connected with his life is one which is to Philip what the stigmata were to Francis of Assisi—a strange palpitation of the heart and fracture of the ribs attributed to the supernatural effects of divine love—which came upon him suddenly one day at prayer in the catacombs. Philip was canonised with Ignatius Loyola and others in 1622.

Philip's literary remains consist of a few letters (8vo, Padua, 1751) and some sonnets printed in the collection of the *Rime Oneste*. The best life of the saint was written by one of the fathers of the congregation, Giacomo Bacci, in 1622, just before Philip's canonisation. Compare *Vita beati P. Phil. Nerii in annos digesta*, by Ant. Gallonio (1600). An English translation, made from a later edition of Bacci, appeared under the editorship of F. W. Faber in 1849. A popular biography has been written by Mrs Hope (Burns and Oates, 1859); and see also the Life by Archbishop Capecelatro (Eng. trans. 1882).

Néris-les-Bains. See MONTLUÇON.

Nero, the last of the Cæsars and the mystic antichrist of primitive Christian tradition, Roman emperor from 54 to 68 A.D., was born at Antium, on the coast of Latium, 15th December

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37, and was the son of Cn. Domitius Ahenobarbus and of the younger Agrippina, the daughter of Germanicus Cæsar, and sister of Caligula. His mother became the wife of the Emperor Claudius, who adopted him (50), his name, originally L. Domitius Ahenobarbus, being changed to Nero Claudius Cæsar Drusus Germanicus. After the death of Claudius (54) the Prætorian Guards, at the instigation of Afranius Burrus, their prefect, declared him emperor, instead of Claudius's son Britannicus, and their choice was acknowledged both by the senate and by the provinces. His reign began with the semblance of moderation and good promise, under the guidance of Burrus and his tutor Seneca the philosopher; but the baleful influence of his mother, together with his own moral weakness and sensuality, frustrated their efforts, and he soon plunged headlong into debauchery, extravagance, and tyranny. He caused the young Britannicus, the son of Claudius, to be treacherously poisoned, and afterwards (59) his own mother Agrippina to be murdered, in order to please his infamous and ambitious mistress Poppæa Sabina. To marry her he divorced and put to death his neglected wife Octavia, the sister of Britannicus. The Roman senate showed the depth of its degradation by presenting an address congratulating the hateful matricide on the death of Agrippina, but Nero himself was ever haunted by the ghost of a murdered mother. The affairs of the empire were at this time far from tranquil. In 61 an insurrection broke out in Britain under Queen Boadicea, which was suppressed by Suetonius Paulinus. Next year saw an unsuccessful war against the Parthians in Armenia. At home the emperor was lampooned in verse; Burrus, a valuable friend, died; and even Seneca, though no rigid moralist out of his books, thought it only decent to remove from court. In July 64 occurred a great conflagration in Rome, by which two-thirds of the city was reduced to ashes. Nero himself is stated by all authorities later than Tacitus to have been the incendiary; and we are told that he admired the spectacle from a distance, reciting verses about the burning of Troy. But he found a convenient scapegoat in the mysterious sect of the Christians, many of whom were put to death with unheard-of cruelties, such as being wrapped in cloth steeped with pitch, and set on fire in the imperial gardens. Moreover, he rebuilt the city with great magnificence, and reared for himself on the Palatine Hill a splendid palace, the famous 'golden house,' and in order to provide for this expenditure and for the gratification of the Roman populace by spectacles and distributions of corn Italy and the provinces were plundered without ruth. A conspiracy against Nero in the year 65 failed, and Seneca and the poet Lucan fell victims to his vengeance. In a fit of passion he murdered his wife Poppæa, by kicking her when she was pregnant. He then offered his hand to Antonia, the daughter of Claudius, but was refused, whereupon he caused the too fastidious lady to be put to death, and married Statilia Messallina, after putting her husband to death. He also executed or banished many persons highly distinguished for integrity and virtue. His undignified vanity led him to seek distinction as a poet, a philosopher, an actor, a musician, and even a charioteer, and he received sycophantic applause, not only in Italy, but in Greece, to which, upon invitation of the Greek cities, he made a visit in 67. But in 68 the Gallic and Spanish legions, and after them the Prætorian Guards, rose against him to make Galba emperor, and Nero fled from Rome to the house of a freedman, Phaon, about four miles distant. The senate now declared him an enemy of his country, and the trembling tyrant saved himself from execution by suicide, 11th June 68. His last words throw light on his pitiful vanity and on the cruel irony of fate that placed him on a throne—'What an artist is lost in me.' See the articles ROME, SENECA, ANTICHRIST, APOCALYPTIC NUMBER, &c.; W. Wolfe Capes, *Early Roman Empire*, and Merivale's *History of the Romans under the Empire*.

Neroli, OIL OF. See ORANGE.

Nertchinsk, a town of eastern Siberia, in the Trans-Baikal Territory, on the Nertcha, a tributary of the Shilka (which is a head-stream of the Amur), 875 miles E. of Irkutsk. The district of which it is the centre yields silver, lead, zinc, tin, and gold; and the town is a trading centre for Russians, Mongols, Turcomans, and Tunguses, exchanging tea, gunpowder, and furs. Pop. 3750. See the *Century Magazine*, October 1889.—Another Nertchinsk, NERTCHINSKIY-ZAVOD, stands 180 miles SE., on a tributary of the Argun, and is also a great mining centre. The silver-mines and gold-mines are largely worked by convict labour, and the pop. of the town, with the mines, is about 5000. The soil in the vicinity is fertile, and the climate mild and agreeable.

Nerthus. See HERTHA.

Neruda, MADAME. See HALLÉ.

Nerva, M. COCCEIUS, a Roman emperor, elected by the senate after the murder of Domitian, 18th September 96 A.D. He was born in 32, of a family belonging to Narnia, in Umbria, and twice held the honour of consulship before his election to the dignity of emperor. He displayed great wisdom and moderation, rectified the administration of justice, and diminished the taxes; but finding himself, on account of his advanced age, not vigorous enough to repress the insolence of the Prætorian Guards, he adopted M. Ulpius Trajanus, then at the head of the army of Germany, who succeeded him on his death, 27th January 98.

Nerval, GÉRARD DE, the adopted name of Gérard Labrunie, one of the most attractive but ill-starred figures among the French Romanticists, was born at Paris, May 21, 1808, son of an officer in the Grand Army. He was educated along with Gautier at the Lycée Charlemagne, and early took to letters, publishing at twenty a translation of *Faust* which pleased Goethe, and gave his choruses to Berlioz. Desultory work, a love-affair cut short by death, fits of restless travel, of dissipation, and of gloom that at times deepened into mental darkness, and at last death, almost certainly by his own hand, 25th January 1855, sum up the wretched story of his life. He moved in a romantic dream-world all his days, squandered money when he had it prodigally upon *bric-à-brac*, read deeply in Greek, Italian, German, English, and Arabic, and wandered carelessly over Italy, Germany, Greece, Syria, Palestine, and Egypt. Gérard de Nerval wrote admirably alike in prose and verse, his style ever delicate, natural, and original, informed with a subtle personal charm of a quite remarkable character. But his travels, criticism, plays, and poems, good literature as they are, are far less interesting than his *Aurélie, ou le Rêve et la Vie* (1855), an experience of his own madness. 'This strange work,' says Andrew Lang, 'does for insanity what the *Dream of Gerontius* has done for death.' In *Les Illuminés, ou les Précurseurs du Socialisme* (1852), he discusses the mysticism of certain highly endowed men in its relation to mental alienation. But his most delightful work will be found in his fantastic short tales, which have an exquisiteness of their own that approaches near perfection. These are the *Contes et Facéties* (1852), and the semi-autobiographic series of *Filles de Feu*, containing *Sylvie*, *Angélique*, *Jenny*,

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Octavie, Isis, Emilie, Corilla (1856). Another book of singular interest is the mélange entitled *La Bohême Galante*. Some of his most charming poems are graceful adaptations of French peasants' folk-songs, the beauty of which he had ears to hear.

His *Œuvres complètes* were collected in 5 vols. in 1868. See Andrew Lang in *Fraser's Magazine*, May 1873.

Nervii, a powerful and warlike people of the ancient Gallia Belgica, whose territory stretched from the Sambre to the ocean, not subdued by Cæsar without an obstinate resistance.

Nervous Diseases. See articles in this work on Alcoholism, Aphasia, Apoplexy, Appetite, Brain, Chorea, Cretinism, Delirium, Delirium Tremens, Epilepsy, Headache, Hydrocephalus, Hypochondriasis, Hysteria, Insanity, Locomotor Ataxy, Meningitis, Myelitis, Neuralgia, Paralysis, Sciatica, Spinal Cord, Sunstroke, Tetanus, &c.

NERVOUSNESS is a term somewhat vaguely used, both popularly and by medical men, to express an unduly excitable condition of the nervous system, manifested by unusually ready manifestation of emotion—e.g. starting at slight causes—by morbid sensitiveness, by unreasonable apprehension, by trembling of muscles, and in many other ways. The condition may be natural, or produced by ill-health or acute disease. It is more common in children than in adults, and in the female sex than the male. Care should be taken to improve the general health by good nutrition, regulation of the bowels, open-air exercise, bathing, change of air and scene, and the ordinary tonic remedies; stimulants and drugs should be avoided save under the special direction of a medical man.

Nervous System, the mechanism by which an animal acquires a knowledge of the external world, and by means of which the great functions of the absorption of food, the elimination of waste products from the body, the respiration, circulation, and muscular action, are regulated and controlled. In its simplest form, in some of the lowest animals, it consists merely of nerve-fibres going to and from a small group of nerve-cells; but from this elementary condition there is an ever-increasing degree of complexity till its highest development is reached in man, which alone is included in the following description. In the articles on Birds, Fishes, Reptiles, Mollusca, &c. will be found paragraphs on the nervous systems of the various classes of animals.

The nervous system is composed of a series of organs—nerve-cells, nerve-fibres, and nerve end-organs. The nerve-cells are situated for the most part in the brain and spinal cord, but also in other parts of the nervous system. Their function is either to receive, to send out, or to modify as they transmit, nervous impulses. The nerve-fibres transmit nerve impulses to and from the nerve-cells. For this reason groups of nerve-cells are often conveniently spoken of as nerve centres; their relation to the nerve-fibres being analogous to that of a telegraph-office to the wires connected with it. The end-organs are the special structures for receiving impressions, such as the various organs of special sense, smell, sight, hearing, taste, touch (see NOSE, EYE, EAR, TASTE, TOUCH), and for transforming outgoing impulses into muscular contractions or secretion, &c. The nerve-fibres thus connect either an end-organ with a nerve centre, or two nerve centres with each other. These three sets of organs, nerve centres, fibres, and end-organs, are grouped into two great systems—the *cerebro-spinal* (fig. 1) and the *sympathetic* (fig. 10) system. The former is composed of the brain, spinal cord, and the cranial and spinal nerves respectively connected with them. The sympathetic system is formed by a double chain of small swellings, called ganglia, on either side of the front of the spinal column, and connected with each other, with the spinal nerves, and the internal organs by fine nerve-fibres (figs. 7 and 10).

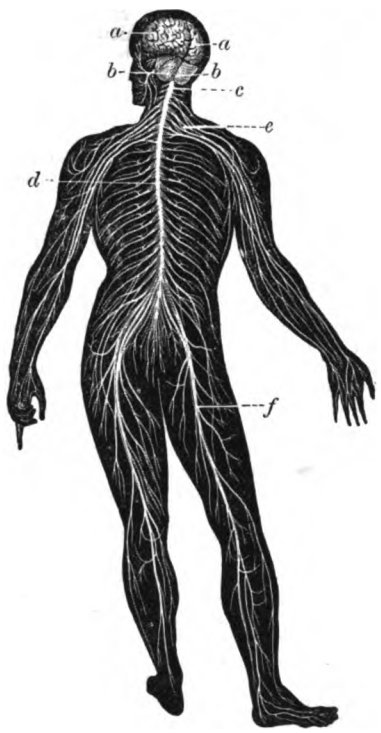

Fig. 1.

a, cerebrum; *b*, cerebellum; *c*, medulla oblongata; *d*, spinal cord, from which the spinal nerves arise; *e*, brachial plexus; *f*, sciatic nerve.

The nerves are whitish cords varying greatly in size. They are composed of nerve-fibres which are bound together by fibrous tissue. This forms a sheath on the outside (the *perineurium*), and sends processes inwards between the individual nerve-fibres (fig. 4 shows a transverse section of part of a nerve, with the bundles of connective tissue passing inward). In the spinal cord and brain the nerve-fibres are held together by a special kind of connective tissue, called neuroglia.

Structure of Nerve-fibres.—A fibre from a spinal nerve has the following structure. In the centre is a very fine fibre or thread called the *axis cylinder*. This runs without any interruption along the whole length of the nerve. It can be traced into a nerve-cell at one extremity, and into an end-organ at the other; and there is reason to believe that it is really an outgrowth from a nerve-cell. It is the essential constituent of a nerve, that namely along which the nervous impulse travels. The axis cylinder is in its turn composed of still finer fibrillæ, which may break up into finer nerve-fibres. Except at its origin and termination, the axis cylinder is covered by a tubular membrane called the *medullary sheath*, or the white substance of Schwann, a whitish substance of a peculiar fatty nature. This is interrupted at intervals of about $\frac{1}{75}$th of an inch by constrictions which (fig. 2) pass completely through its thickness. When a nerve is stained with nitrate of silver, a black colour is formed at the intersections, and for a short distance along the axis cylinder (see fig. 3, where two are represented). These interruptions

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are called nodes of Ranvier, after their discoverer, and are supposed to allow of the percolation of lymph to nourish the axis cylinder. When a nerve

Fig. 2.
Small part of a nerve-fibre with axis cylinder, surrounded by medullary sheath. The primitive sheath passes over the constriction in the medullary sheath.

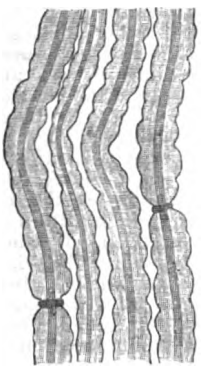

Fig. 3.
Nerve-fibres, stained with nitrate of silver, showing two nodes of Ranvier.

is divided transversely, and stained appropriately, the axis cylinder appears as a small point surrounded by a ring of the whitish medullary sheath

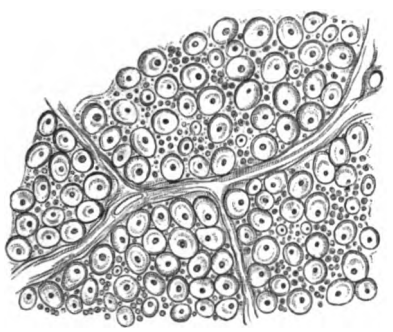

Fig. 4.

(fig. 4). This sheath is enclosed by a continuous investment, the *primitive sheath*. This is colourless, and very delicate, and has a nucleus on its inner side corresponding to each segment of the medullary sheath. In the sympathetic system the medullary sheath is absent; while the fibres of the brain and spinal cord retain the medullary sheath,

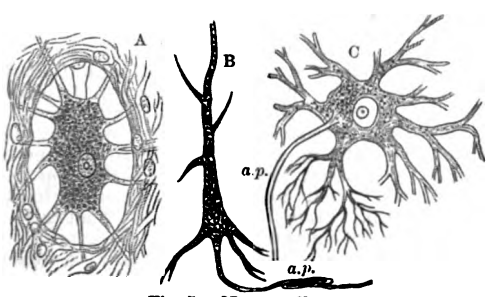

Fig. 5.—Nerve-cells:
A, from sympathetic ganglion; B, from cerebrum; C, from spinal cord; *a.p.*, axis cylinder process.

but want the primitive membrane. The sympathetic fibres are often called gray or non-medullated; the others, white or medullated. The nerve-fibres in the limbs are about $\frac{1}{1500}$th of an inch in diameter; in the brain they may be nearly ten times finer.

The nerve-cells vary greatly in size and in form. Many of them, especially in certain regions of the cortex of the brain, have the shape of an elongated pyramid (fig. 5, B), with fine processes coming off at various points, others are very irregular in outline, but also with numerous processes, one of which can frequently be traced into continuity with a medullated nerve, and hence is called the *axis cylinder process*, while the others form a fine network before entering another cell or fibre. Such cells are called multipolar (fig. 5, A and C), and are seen best in the anterior horns of the gray matter of the spinal cord. Many cells, again, are bipolar—i.e. they have only two fibres, one at each pole, in connection with them.

The various end-organs are described under the

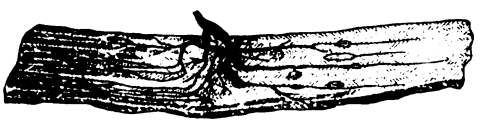

Fig. 6.

special sections. Fig. 6 shows the manner in which the fibres of a nerve end in a muscle.

The nerves arising from the brain are arranged in twelve pairs. The first, or olfactory, is the nerve of smell. The second, or optic, is the nerve of sight. It arises from the retina, meets with its fellow in the optic chiasma, and is distributed half to each side of the brain, terminating partly in the corpora quadrigemina (for the reflex movements of the eye), and partly in the optic thalamus, passing thence to the occipital lobe of the cerebrum (for the sense of sight). The third or oculo-motor nerve arises under the corpora quadrigemina, and passes to all the muscles of the eye except two, which are supplied by the fourth and sixth pairs. The fourth nerve, arising immediately behind the third nerve, supplies the superior oblique muscle of the eye; while the sixth pair, arising from a nucleus near the middle of the floor of the fourth ventricle, supplies the external rectus muscle of the eye. The fifth pair has a very long origin from a point at the level of the third nerve down to the upper part of the spinal cord. It is the motor nerve to the muscles of mastication, and the sensory nerve to the face, front of the head, teeth, tongue, and is the nerve of taste of the anterior part of the tongue. It is this nerve which is concerned in neuralgia of the head and face and teeth. The seventh pair arises from the lower part of the pons Varolii (see BRAIN), and is the motor nerve to the facial muscles of expression. Injury to or disease of this nerve causes facial palsy, or Bell's paralysis. The eighth pair, or auditory nerve, supplies the internal ear. It is divided into two parts, one of which supplies the cochlea, and is the nerve of hearing proper, while the other supplies the semicircular canals, and is concerned in the maintenance of the equilibrium of the body. The nerve arises from the lateral and posterior part of the pons Varolii and medulla oblongata. The ninth pair, or glosso-pharyngeal nerve, is the special nerve of taste, and supplies the hinder third of the tongue, with the taste bulbs of which it is connected. The tenth pair, or pneumogastric nerve, has a very wide area of distribution to the lungs, heart, stomach, &c.; it is partly motor and partly sensory in function. The eleventh pair, or spinal accessory nerve, is the motor nerve to the larynx, and to certain muscles in the upper part of the neck. These three nerves arise from a groove in the side of the medulla oblongata and

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upper part of the spinal cord. The twelfth pair, or hypoglossal nerve, is the motor nerve of the tongue. Its origin is near the floor of the fourth ventricle, close to the middle line, and it emerges from the anterior surface of the medulla oblongata in a shallow groove between the anterior pyramids and the inferior olivary body (see BRAIN).

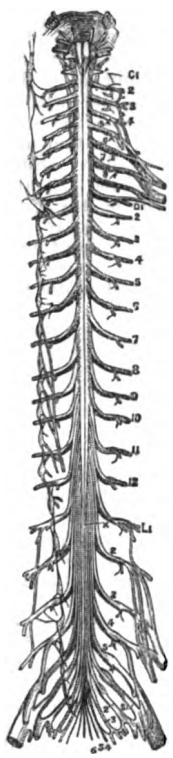

Fig. 7.

The spinal nerves arise from the spinal cord in pairs, thirty-one in number, and are named according to their relation to the vertebræ—cervical, dorsal, lumbar, and sacral. Their mode of origin will be understood from fig. 7, which represents diagrammatically the first part of their course, and on one side their relations with the sympathetic system—C 1–8 represents the eight pairs of cervical nerves; D 1–12, the twelve dorsal pairs; L 1–5, the five lumbar pairs; and S 1–6, the six sacral pairs of nerves. Each spinal nerve arises by two roots, an anterior and a posterior (fig. 8, *a* and *p*; see also SPINAL CORD). These roots pass outwards, and unite before they leave the spinal canal. Before their union a small oval swelling is found on the posterior root, and is called its *ganglion*, *g*. The united nerve leaves the spinal canal by a small aperture between adjacent vertebræ. It almost immediately gives off a fine medullated nerve to its corresponding sympathetic ganglion, a branch which can be traced into one of the internal organs. It also receives from the ganglion a non-medullated or gray fibre, which is distributed to the muscular coat of the blood-vessels, especially the arteries. The nerve thus altered passes outwards, dividing as it goes to send its ultimate branches into the fibres of the muscles, into the cells of the skin and connective tissues, tendons, and bones. In the dorsal region each nerve passes to its distribution without entering into connection with its neighbours, but in the cervical, lumbar,

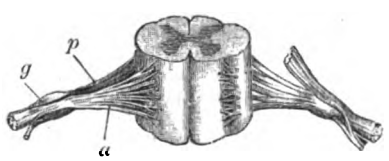

Fig. 8.

and sacral regions the nerves split up and form new junctions with each other, or *plexuses* as they are called. (These are indicated in fig. 1, and on the right-hand side of fig. 7, but the detailed description of them is impossible within the limits of this article.)

Functions of the Spinal Nerves.—Sir Charles Bell discovered that division of the anterior roots was followed by loss of power of voluntary motion, and that division of the posterior roots destroyed the power of sensation. He termed the anterior root motor, and the posterior sensory. It has since been ascertained that the anterior roots carry outwards other impulses that do not result in motion, and that the posterior roots carry inwards impulses which may not result in sensation. Therefore, it is more correct to term these roots respectively *efferent* and *afferent*. If the anterior root be divided between the point of its origin from the cells of the anterior horn of the spinal cord and its junction with the posterior root, the part unconnected with the cord will waste along the whole length of the nerve, and the muscles which it supplies will waste also. The cells in connection with the anterior roots, therefore, not only send out motor impulses, but exert a nutritive or *trophic* influence on the nerve and muscle. Division of the posterior root beyond its ganglion is followed by wasting of the corresponding fibres of the nerve to their ultimate termination. If the root be cut between the ganglion and the spinal cord, the part attached to the ganglion remains unaltered, while that connected with the spinal cord wastes. This shows that the ganglion of the posterior root exerts a trophic influence on the fibres connected with it. If the nerve be divided after the junction of the two roots, the whole of the nerve farthest from the spinal cord will waste.

The afferent nerve impulses which pass along the posterior roots comprise those which give rise to the sense of touch, pain, and temperature, and to reflex movements of various kinds without necessarily exciting our consciousness, such as those concerned with the maintenance of the equilibrium of the body, and with the functions of the internal organs.

Reflex Action.—By this we mean an action brought about directly by the influence of an afferent impulse quite independently of voluntary control. For such an action four elements are necessary: (1) afferent fibres, (2) nerve cells or centres, (3) efferent fibres, (4) muscle fibres. The impulse travels up the afferent fibres and stimulates the nerve-cells to send an impulse along the efferent fibre to the muscles. If any of these four factors is absent, the reflex action cannot take place. A familiar example is the moving of the foot as the result of tickling the sole. The afferent impulse passes up the nerves to the nerve centres in the spinal cord, which send outwards direct to the muscles motor impulses, which often cannot be controlled by the will.

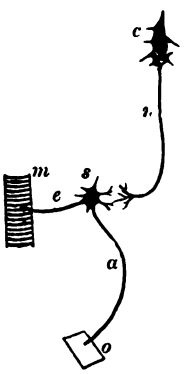

Fig. 9.

Automatic Action.—When movement is brought about by an impulse originated in a nerve centre itself, without the influence of an afferent stimulus, it is called automatic or spontaneous. Such actions are apt to occur rhythmically, such as the action of the heart.

Voluntary Actions.—In these the outgoing impulses originate in the nerve-cells in the motor area of the brain, and pass down the opposite side of the spinal cord to the nerve-cells in its anterior horn. From thence they are transmitted by the efferent nerves to the muscles. Fig. 9 will explain the relation of voluntary to reflex action: *c* is a nerve-cell in the brain; *n*, the nerve-fibre in the spinal cord which transmits the nerve impulse originating in *c* to *s*, a cell in the anterior horn of the spinal cord which forwards it through a nerve, *e*, to a muscle, *m*. The reflex arc is represented by *o*, an end-organ; *a*, an afferent nerve; *s*, a nerve-cell; *e*, an efferent fibre; *m*, a muscle. If *c* or *n*, or both, be destroyed by disease, the power of voluntary

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motion will be lost, but the reflex arc, *o*, *a*, *s*, *e*, *m*, remains intact. We can sometimes control or repress a reflex action voluntarily. The cell *c* in the brain can so act on the cell *s* as to hinder or inhibit its ordinary response to a stimulus, and when the cell in the brain is destroyed the cell *s* is more easily stimulated reflexly, apparently because some restraining influence is removed. Such a restraining action is exerted on the heart by the pneumogastric nerve, which, when stimulated, slows or stops its movements; and in the same way the secretion of glands may be interfered with by abnormal stimulation of their nerve centres. This influence is termed inhibitory action, and is one of great importance.

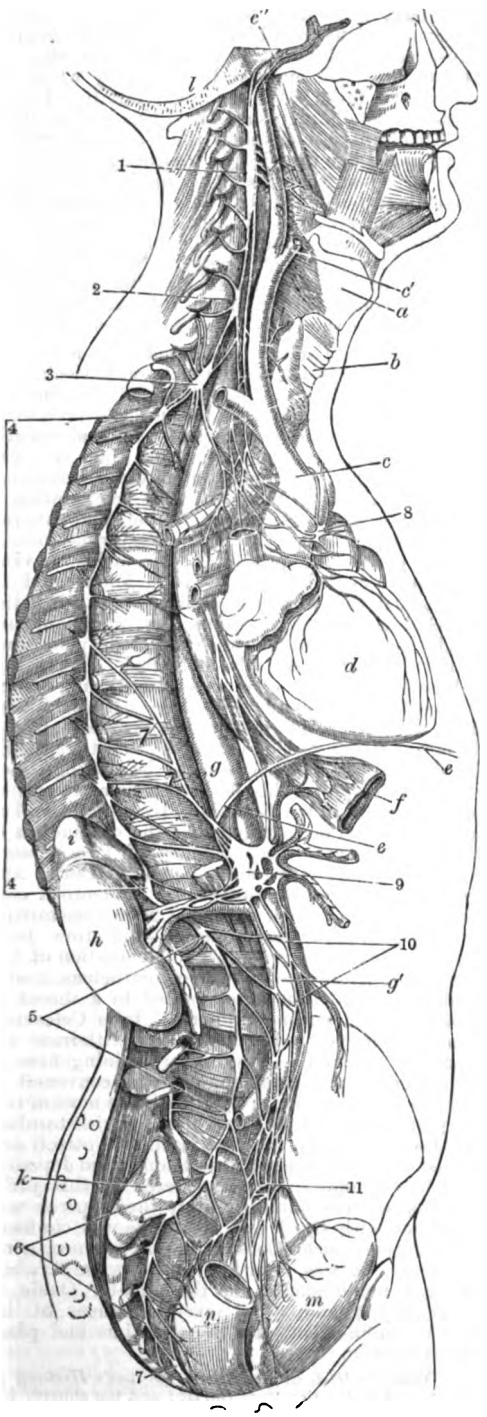

Fig. 10.—The Sympathetic Nerve; the right lateral walls of the chest and abdomen, and the stomach, intestines, liver, spleen, and pancreas being removed to bring it in view:

1, 2, 3, the superior, middle, and inferior cervical ganglia; **4,** the two lines from this figure include the twelve dorsal ganglia; **5,** include the four lumbar ganglia; **6,** include the five sacral ganglia; **7,** the ganglion impar; **8,** cardiac plexus; **9,** solar plexus; **10,** aortic plexus; **11,** hypogastric plexus; *a*, the larynx; *b*, the trachea; *c*, arch of the aorta; *c'*, external carotid; *c''*, internal carotid; *d*, the heart; *e*, *e*, the diaphragm; *f*, the cardiac end of the œsophagus; *g*, thoracic, and *g'*, abdominal aorta; *h*, the kidney; *i*, the supra-renal capsule; *k*, the sacrum; *l*, the section of base of the skull; *m*, the bladder; *n*, the lower portion of the rectum.

Secretory Nerves.—The nerves which induce the various acts of secretion leave by the motor cranial nerves, or by the anterior roots of the spinal nerves; but the description of their distribution, &c. must be relegated to the article SECRETION.

The *sympathetic* system is, as already stated, composed of a series of ganglia situated on either side of the spinal column along its whole length. In the dorsal, lumbar, and sacral regions the ganglia correspond in number to the vertebræ; but in the cervical region there are only three, of such large size, however, that they are generally supposed to represent the fusion of a number of ganglia. Below, the two chains unite in front of the coccyx in a single ganglion. These ganglia are formed of multipolar nerve-cells (fig. 5, A), and are united with each other by gray nerve-fibres. Each ganglion gives to its corresponding spinal (or cranial) nerve a gray non-medullated nerve, and receives from it a fine white medullated nerve. The fibres of distribution may be studied in fig. 10. They pass to the blood-vessels and to the mucous membranes and muscular coats of the various internal visceras, and become united with each other in fine networks or plexuses, on many of which nerve-cells or ganglia are situated.

The sympathetic chain is continued upwards as a fine plexus of nerves on the internal carotid artery, on the various branches of which it is distributed. From the superior cervical ganglion also fibres pass to the various arteries in the neck and face, and to form, along with the pneumogastric and glosso-pharyngeal nerves, the pharyngeal plexus on the muscles and mucous membrane of the pharynx.

From some of the cervical and upper thoracic ganglia fibres pass into the chest, to form also, along with the pneumogastric nerve, two important plexuses, named pulmonary and cardiac, from which branches pass to the lungs and heart, and undoubtedly influence their functions. From the thoracic ganglia also arise the three splanchnic nerves which pass into the abdomen to enter the solar or epigastric and the renal plexus. The solar plexus is situated at the pit of the stomach, and is connected with two large semilunar ganglia, which send branches to all the blood-vessels and to all the organs within the abdomen. It is owing to the relations and functions of the solar plexus that blows in this region are so dangerous. The hypogastric plexus arises from the lumbar ganglia, and sends branches to the blood-vessels and to the organs in the lower part of the abdominal cavity, more especially the organs of generation, the lower bowel, and the bladder.

The functions of the sympathetic system are still

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imperfectly understood. It supplies fibres to the muscles of blood-vessels to regulate their calibre; hence these fibres are called *vaso-motor*. The vaso-motor centre is situated, not in the sympathetic system, but in the medulla oblongata. The path for the fibres passes down the spinal cord, which it leaves by the anterior roots at various levels to pass along the white communicating branches into the sympathetic ganglia. From these ganglia the vaso-motor nerves for the internal organs pass into the various plexuses just described, while those for the vessels of the limbs and trunk return to the spinal nerve by the gray communicating nerve. Further, the muscular movements and secretions of all the internal organs are regulated through the sympathetic system.

Of the nature of nerve energy we know little. The nervous impulse travels along a nerve in man at a rate of about 34 yards per second, and it is accompanied by certain electrical changes in the nerve, but nerve energy is not identical with electrical energy. It is probably accompanied by molecular changes in the structure of the nerve as yet inaccessible to our means of investigation. In like manner the origination or discharge of nerve impulse in a cell is probably induced by similar but more active changes in its substance.

See Quain's *Anatomy*, Foster's *Physiology*, Landois and Stirling's *Physiology*, and Obersteiner's *Anatomy of the Central Nervous System* (translated by Hill).

Nesle, TOUR DE. The ancient castle of the noble family Nesle stood, with its gate and tower, at an angle of the city wall of Paris, on the south bank of the Seine, where now stands the palace of the Institute. It came into the hands of the crown, was the scene of events recorded by Brantôme, and was bought by Cardinal Mazarin as the site for his college.

Ness, LOCH, a long, narrow lake of Inverness-shire, the second largest in Scotland, 6½ miles SW. of Inverness. Lying 50 feet above sea-level, it extends 22½ miles north-north-eastward, and has an average breadth of 1 mile, with an area of 19 sq. m. It receives the Morriston, Oich, Foyers (q.v.), and other streams, and sends off the river Ness to the Moray Firth. It lies in the valley of Glenmore, on the line of the Caledonian Canal (q.v.), and is enclosed by steep mountains—the highest, Mealfourvonie (2284 feet). Owing to its great depth (in places 780 feet) it never freezes to any considerable extent. See FORT AUGUSTUS.

Nesselrode, KARL ROBERT, COUNT, Russian diplomatist, was born on the 14th December 1780, at Lisbon, where his father, a descendant of an ancient noble family on the lower Rhine, was then Russian ambassador. He gained in a high degree the esteem and confidence of the Emperor Alexander, and in 1814 he accompanied the Russian emperor to France, where he took a principal part in all the negotiations which ended in the peace of Paris; and he was one of the most prominent of the plenipotentiaries in the Congress of Vienna, and one of the most active diplomatists of the Holy Alliance. The Emperor Nicholas reposed in him the same confidence, and amidst the European convulsions of 1848 and 1849 Russia, under his guidance, refrained from interference, till an opportunity occurred of dealing a deadly blow to the revolutionary cause in Hungary. Being one of the chiefs of the moderate party in Russia, Nesselrode exerted himself to preserve peace with the Western Powers; and after the war had broken out in 1854 he undoubtedly strove for the re-establishment of peace. After the accession of Alexander II. he retired from the direction of foreign affairs, and was succeeded by Prince Alexander Gortschakoff, but retained the dignity of chancellor of the empire. He died 23d March 1862, and his autobiography appeared at Berlin in 1866.

Nessus. See HERCULES.

Nestor, according to ancient Greek legend, the son of Neleus and Chloris, born in the Messenian Pylos, escaped destruction when Hercules slew all his brothers. He married Eurydice, by whom he became the father of a numerous family. In his youth he was distinguished for valour in wars with the Arcadians, Eleians, and the Centaurs, and in his advanced age for wisdom. Although he was an old man when the expedition against Troy was undertaken, he joined it with his Pylians in sixty ships. Homer makes him the great counsellor of the Greek chiefs, and extols his eloquence as superior even to that of Ulysses. Nestor returned in safety to his own dominions after the fall of Troy, and continued for long to rule over the people of Pylos.—For the birds called Nestor, see KEA.

Nestorius, a native of Germanicia, a city of northern Syria, in the patriarchate of Antioch, was probably a disciple of the celebrated Theodore of Mopsuestia. Having received priest's orders at Antioch, he became so eminent for his zeal, ascetic life, and eloquence in preaching that he was selected by the emperor as patriarch of Constantinople (April 428). Soon after his consecration a controversy arose as to the divine and human natures of our Lord, in which Nestorius took a leading part. The presbyter Anastasius, having in a sermon denied that the Virgin Mary could be truly called the Mother of God (*θεοτόκος*), it being not God the Logos but only the human nature which had a mother and suffered pain and death, Nestorius warmly defended Anastasius, and elaborated his view into the theory which has since been known by his name. He held that Mary was the Mother of Christ (*χριστοτόκος*), or the Receptive Organ of God (*θεοδόχος*), and that, while the divinity of the Logos is to be distinguished from the temple of his flesh, yet there remained but one person in the God-man. By his antagonists he was accused of exaggerating the distinction of two natures into a co-existence of two persons (*προσώπων ἴνωσις*)—the human person of Christ and the Divine Person of the Word. A vigorous controversy ensued, which extended from Constantinople to the other patriarchates, and drew from Cyril of Alexandria a formal condemnation of the doctrine of Nestorius in twelve anathemas, and a similar condemnation, accompanied by a threat of deposition and excommunication, from Celestine, Bishop of Rome, unless he would withdraw the obnoxious doctrine. Nestorius remaining firm in his opinions, a general council was convened at Ephesus in 431, at which Cyril took the most active and prominent part, and in which, notwithstanding the absence of John the Patriarch of Antioch and his bishops, Nestorius was condemned and deposed. Considerable opposition was offered to this judgment for a time, but ultimately the emperor was led to side with Cyril, and Nestorius was confined in a monastery near Constantinople, whence, after four years, he was banished to Petra in Arabia. He next found shelter in the Greater Oasis in Upper Egypt, and, after several changes of his place of confinement, died in exile, time and place alike unknown.

See Walch's *Hist. d. Ketzereien;* Dorner's *History of the Doctrine of the Person of Christ;* and the church histories of Gieseler and Neander.

The sect of the NESTORIANS, formed in the 5th century, was, after its exclusion from the Roman empire, extended into Persia, India, and even China. The teachers who were driven out of Edessa settled at Nisibis, which soon became an active centre

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of learning and missionary enterprise throughout Persia. Babæus, Bishop of Seleucia (498–503), assumed the title of patriarch, and openly professed Nestorianism, and under his successors the sect grew rapidly and produced many learned theologians and philosophers, and physicians like Hippocrates and Galen. Under the rule of the califs the Nestorians enjoyed toleration, and spread in Arabia, Syria, and Palestine, and even to Samarcand, Herat, and China. The Prester John (q.v.) of romance was a Christian of this colour, and there is a tradition that Mohammed learned what he knew of Christianity from Sergius, a Nestorian monk. In the middle of the 13th century as many as twenty-five metropolitans owned the jurisdiction of the Nestorian patriarch, but after the persecutions of Tamerlane they dwindled away. Meantime the Roman Catholic Church had been active in missionary labours amongst them, and already in the 14th century the pope was nominally at least acknowledged as the head shepherd of all Christendom. In the 16th century a great schism took place, a portion renouncing their distinctive doctrine, and placing themselves under the jurisdiction of the Roman pontiff, to whom, under the title of Chaldean Christians, they have since remained faithful. Their patriarchs still bear the traditional name of Joseph. The others to the present day maintain their old creed and their ancient organisation. Their chief seat is in the mountain-ranges of Kurdistan. They are at present a poor and illiterate race, and were carefully estimated in 1833 to number 70,000 souls. Their patriarch since the close of the 17th century has borne the name of Simeon. The bishops are bound to observe celibacy, but marriage is permitted to the priests and inferior clergy. Their liturgical books recognise seven sacraments, but confession is infrequent, if not altogether disused. Marriage is dissoluble by the sentence of the patriarch; communion is administered in both kinds; and although the language of the liturgy plainly implies the belief in transubstantiation, yet, according to Layard, that doctrine is not popularly held among them. The fasts are strict, and of very long duration, amounting to very nearly one-half of the entire year. They pray for the dead, but are said to reject the notion of purgatory, and the only sacred symbol which they use or reverence is the cross. The Nestorians of Kurdistan, like the Christians of the Lebanon, have suffered much from time to time through the fanaticism of the wild tribes among whom they reside. In a massacre in 1843, and again in 1846, as many as six thousand perished, and even still they owe much of their security to the influence exercised in their favour by the foreign representatives at the Turkish and Persian courts. There has been among them since 1834 an active American mission, which has translated the Bible into their speech—a dialect of the old Aramaic.

There is another body of Nestorians who have existed in India from the period of the early migrations of the sect, and who are called by the name of Syrian Christians. Their chief seat is in Travancore, where they number about 100,000.

See GREEK CHURCH, Vol. V. p. 398; Assemani, *Biblioth. Oriental.*, t. iv.; Le Quien, *Oriens Christ*, ii.; Hefele's *Councils*, lib. ix. (vol. iii. of Clark's trans.); Petermann's article in Herzog's *Real-Encyclop.*; Perkins's *Residence of Eight Years in Persia among the Nestorian Christians* (Andover, 1843); Badger's *Nestorians and their Rituals* (1852); Anderson's *Oriental Churches* (1872); Dean Stanley's *History of the Eastern Church*; and Professor Legge's *Nestorian Monument of Hsi-an Fu, rel. Christ. in China* (1888).

Nests are prepared for egg-laying, brooding, and nursing purposes. How widely they may vary according to surroundings, the skill of the builder, and the needs of the young is best illustrated by birds, which excel all other animals in the art of cradling. It is not always possible to distinguish between a nest and a home, as the same structure may serve both purposes, but it is interesting to notice that the latter seems sometimes to have been evolved out of the former, as in the case of bees, where the complex hive has grown round about a simple nest. Referring to special articles, and above all to BIRD, we shall simply mention, in illustration, the squirrel's large and lofty shelter, and the minute cradle of the harvest-mice among the reeds; the æsthetic honeymoon-bower of the bower-bird, and the beautiful hanging-nests of the weavers; the holes prepared by the alligator and some other reptiles; the beautiful grassy structure woven and glued together by the stickleback, and the seaweed nest of the black goby; and finally, the social nests of ants, bees, and wasps. See ANT, BEE, EDIBLE BIRDS'-NEST, FISH, &c.; J. G. Wood's *Wonderful Nests* (1887); and F. Houssay, *Les Industries des Animaux* (Paris, 1890).

Netherlands, the north-west corner of the great north European plain, a triangular region between France, Germany, and the sea, lying mainly in the basins of the Scheldt, the Meuse, and the lower Rhine, is now divided into nearly equal parts between the kingdoms of Holland and Belgium. The official designation of Netherlands is retained by what we commonly call Holland (q.v.), and under that head the early history common to the two is discussed; while the history of the 'Spanish Netherlands' falls mainly under the head of Flanders (q.v.) and Belgium (q.v.). The history of the Dutch and Flemish language and literature will be found under HOLLAND.

Netherlands Trading Company. See JAVA.

Netley, a place on the east side of Southampton Water, 3 miles SE. of Southampton, with a ruined Cistercian abbey, founded in the time of Henry III., and the Royal Victoria Hospital. The latter superb building is for the reception of invalids from the army on foreign service, and from among the troops serving in the adjoining military districts. It nominally has accommodation for 878 patients, but for a few months during the trooping season room has usually to be found for over 1000. The medical staff consists of a surgeon-general as principal medical officer, a registrar and secretary, and medical officers of various ranks. The invaliding depôt attached consists of a colonel on the staff ranking as an assistant-adjutant-general, a paymaster, and a quartermaster. The total cost of the construction of this hospital, whose foundation-stone was laid by Queen Victoria on 19th May 1856, was about £350,000. Attached is the Medical School for candidates for the army medical staff (see MILITARY SCHOOLS). Netley is also the headquarters of the female nurses of the army. A direct line from Portsmouth, the port of disembarkation of invalids, has been opened, and they can now be brought to this hospital in thirty minutes.

Nets. A net is a kind of trap formed of string worked into open meshes and used for capturing fishes, birds, and other animals. The cord or string is knotted at the intersections so as to keep the meshes of their original size. As there is evidence that nets were used in prehistoric times, and since they are almost everywhere made by savage tribes, it is probable that they were among the earliest implements constructed by primitive man for procuring animal food.

Remains of nets belonging to the stone age have been found at Robenhausen and Vinelz in Switzer-

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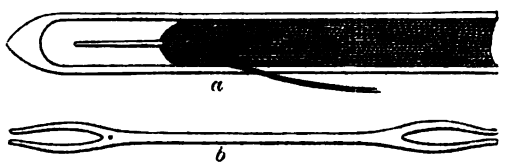
land. Not only do the paintings on ancient Egyptian monuments show that in the days when these were executed nets were in common use, but portions of actual nets of great age have been obtained in Egypt. They are also represented on the monuments of ancient Greece. The Eskimo and Tchuktchis make nets of twisted sinew or of strips of seal-skin, and the Chinese construct fine nets from the cocoons of the wild silkworm, which are soaked in oil so as to render them barely visible. Silk nets also are used in Greece. In some parts of the world nets are made of the fibres of plants but little known; but in civilised countries the chief materials used in their construction are hemp and cotton, and to a less extent flax. More nets are now made of cotton than of hemp, because, although the former are less durable, they are of lighter weight, more easily managed, and a smaller number of corks and bungs suffices to float them.

The making of nets by hand is an extremely simple operation. Only two instruments are required—viz. a netting-needle like *a* in the figure, for meshes above one-half inch in width, or one like



b for meshes under this size, and a mesh-pin, which is simply a straight piece of wood of oval section and a few inches long, upon which the loops are formed. If the meshes are to be one inch from knot to knot, then the circumference of the mesh-pin requires to be two inches. There are two ways of forming the knots on hand-made nets (see KNOTS, figs. 11 and 13), but both are equally simple, and the whole process can be learned in a few minutes by seeing an operator at work. In some countries nets are still largely made by hand.

Netting-machines are now extensively used for the manufacture of nets. The looms are of complicated construction, and it would require a considerable number of illustrations and detailed descriptions to give even a general idea of how they perform their work. One of the most successful of these is known as the Paterson net-loom. It was invented by Mr James Paterson, and subsequently (1835) brought into a more practical shape by Mr Walter Ritchie, both of Musselburgh. (The knot made by this loom is the same as fig. 13 of KNOTS.) It works by a peculiar arrangement of hooks, needles, and sinkers. Since the middle of the century Messrs J. & W. Stuart, who then took up Mr Paterson's business, have made some further improvements upon his loom. An improved form of a net-loom, on a different principle, invented by a Frenchman named Pecqueur, in 1840, was subsequently patented in England. The designers of the later and more perfect form of this loom, which does its work well, are MM. Baudouin and Jouannin. Their English patent is taken out in the name of W. Clark, agent, and the specification, which contains a number of explanatory lithographs, is dated 19th September 1861 (No. 2340).

A variety of nets are used by fishermen, but the principal kinds are the *seine*, the *drift-net*, the *moored-net*, and the *trawl* (see FISHERIES). The net used for taking the tunny in the Mediterranean is often nearly a mile long, and some Russian hand-made nets are 3000 feet in length. Means are adopted to increase the durability of cotton and hemp nets, especially of the former. One plan is to tar them; but, although this to some extent prevents the injurious action of sea-water upon them, it has the disadvantage of hiding faulty parts. They are, however, much more frequently 'barked' in an infusion of cutch (see CATECHU), which like tar lessens the action of salt water upon them and at the same time admits of the state of the meshes being better seen. A solution of alum is also useful in preserving the fibre of the string of which nets are made.

One or two kinds of nets are made for catching birds, such as *fly-nets* for waders frequenting the seashore, and *clap-nets* for small birds (see WILDFOWL). Fine nets are used to capture insects, and by the inhabitants of some countries as a protection from mosquitoes. Other kinds are employed to protect fruit and blossoms, for articles required on board ship, for mess-cooking, and for domestic purposes.

Nettle (*Urtica*), a genus of plants of the natural order Urticeæ, having unisexual flowers, the male and female on the same or separate plants; the male flowers with a 4-parted perianth and four stamens; the female flowers with a 2-parted perianth and a tufted stigma; the fruit an achenium. The species are herbaceous plants, shrubs, or even trees, many of them covered with stinging Hairs (q.v.), which pierce the skin when touched, and emit an acrid juice, often causing much inflammation and pain. When a nettle is grasped in such a way as to press the hairs to the stem no stinging ensues; but the slightest inadvertent touch of some of the species produces very severe pain. The acridity which is characteristic of all nettles, more or less, is by some said to be due to bicarbonate of ammonia, or according to others free formic acid being present in the limpid juice secreted by the glandular hairs of the leaves and stems. The stinging of the native nettles of Europe is trifling in comparison with that of some East Indian species. *U. crenulata* is particularly notable for the severity of the pain which it produces, without either pustules or apparent inflammation. The first sensation is merely a slight tingling, but within an hour violent pain is felt, as if a red-hot iron were continually applied, and the pain extends far from the original spot, continues for about twenty-four hours and then abates, but is ready to return in its original intensity on the application of cold water, and does not cease for fully eight days. Cold water has a similar effect in increasing or renewing the pain of all kinds of nettles. Still more formidable than this species is *U. urentissima*, the *Devil's Leaf* of Timor. Of British species the most venomous, but the most rare, is the Roman Nettle (*U. pilulifera*); next to it is the Small Nettle (*U. urens*), frequent about towns and villages, and in waste and cultivated ground; whilst the least venomous is the most common and only perennial species, the Great Nettle (*U. dioica*), everywhere abundant, but particularly near human habitations, or their former sites, the desolation of which it may be said to proclaim. The roots of nettles, boiled with alum, afford a yellow dye; and the juice of the stalks and leaves has been used to dye woollen stuffs of a beautiful and permanent green. The young shoots of *U. dioica* have been much used in some parts of Scotland and other countries as greens, and their peculiar flavour is much relished by some, although, in general, the use of them is confined to the poor. They are valuable as antiscorbutics, but are gritty to the taste from the quantity of crystals (Cystolithes) contained. Whatever it is that gives nettles their stinging power is dissipated by boiling and drying. The high

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value of nettles as food for swine is well known to the peasantry of many countries; the great nettle is cultivated in Sweden for fodder of domestic animals; and nettles are also highly esteemed as food for poultry, particularly for turkeys. The seeds are extremely nutritious to poultry, and are given to horses by jockeys, in order to make them lively when they are to be offered for sale. The stalks and leaves of nettles are employed in some parts of England for the manufacture of a light kind of beer, called *Nettle Beer*. The *bast*-fibre of nettles is useful for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of *U. dioica* was used by the ancient Egyptians, and is still used in Piedmont and other countries. When wanted for fibre the plant is cut in the middle of summer, and treated like hemp. *Nettle-cloth*, or *Grass-cloth*, is a beautiful fabric made from rhea fibre (see BŒHMERIA). The fibre of *U. cannabina*, a native of the south of Siberia, central Asia, is much used; and from that of *U. whitlavi* both fine lace and strong ropes can be manufactured. The fibre of *U. japonica* is much used in Japan, and that of *U. argentea* in the South Sea Islands; that of *U. canadensis* is used in Canada; and that of *U. heterophylla*, a widely-diffused Indian species, described by Roxburgh to be the most ferocious-looking plant he ever saw, is of very glossy silky appearance, and is manufactured into cloth in Assam. The seeds and herbage of *U. membranacea* are used in Egypt as emmenagogue and aphrodisiac; and somewhat similar properties are ascribed to *U. dioica*. *U. tuberosa* produces tubers, which are nutritious, and are eaten in India raw, boiled, or roasted. Australia produces a magnificent tree-nettle, *U. gigas*, abundant in some parts of New South Wales, ordinarily from 25 to 50 feet high, but sometimes 120 or 140 feet, with trunk of great thickness, and very large green leaves, which when young sting violently.—The Dead-nettle (q.v.) is quite a distinct plant; so is the Nettle-tree (q.v.).

Nettlerash, or URTICARIA (Lat. *urtica*, 'a nettle'), is the term applied to a common form of eruption on the skin. The eruption consists of wheals, or little solid eminences of irregular outline, and either white or red, or most commonly both red and white, there being a white centre with a red margin. The rash is accompanied with great heat, itching, and irritation, but is always aggravated by scratching; the appearance on the skin and the sensation being very much like the appearance and feeling produced by the stinging of nettles; and hence the origin of its names. The eruption is characterised by the extreme rapidity with which it appears and disappears; the whole duration of the attack may be a few hours or even less; but it is extremely apt to recur at regular or irregular intervals: it is very rare for the wheals to persist more than a day.

The disease may be either acute or chronic. In the acute form feverishness may precede the rash by a few hours, or may be altogether absent. The disorder is often connected with some derangement of the digestive organs, and may be traced to the imperfect digestion of special articles of food, such as oatmeal, the kernels of fruit, strawberries, cucumbers, mushrooms, and especially oysters, mussels, and crabs, which are eaten with perfect impunity by most persons. It may be brought on also by local causes of irritation, and frequently complicates other irritable diseases of the skin.

The chronic form is often very troublesome, and frequently comes on periodically in the evening. Cases are reported in which persons have been afflicted for ten years continuously by this form of the disease. It is characterised by constant recurrence during long periods, not by persistence of a single outbreak of the eruption. In the treatment of the acute form local causes of irritation must first be looked for and removed. Where it is brought on by some article of diet relief is often obtained by taking a teaspoonful of bicarbonate of soda (baking soda); but it may be necessary to administer emetics and purgatives, if vomiting and diarrhœa do not occur spontaneously. In the chronic form the patient should, in the first place, determine whether the rash is caused by any particular article of diet, and if this seems not to be the case an attempt must be made to improve the state of the digestive organs. A few grains of rhubarb taken daily, just before breakfast and before dinner, will sometimes effect a cure. Numerous other remedies have been recommended; perhaps the most generally useful is a draught containing a scruple each of the carbonates of magnesia and soda with five drops of tincture of nux vomica. Although external applications are usually of little avail, dusting the itching surface with flour sometimes affords temporary relief; and a still more useful application is a lotion composed of a drachm of the carbonate of ammonia, a drachm of the acetate of lead, half an ounce of laudanum, and eight ounces of rose-water.

Nettle-tree (*Celtis*), a genus of deciduous trees of the natural order Ulmaceæ, with simple and generally serrated leaves, considerably resembling those of the Common Nettle, but not stinging. The genus is distinguished chiefly by its fruit, which is a fleshy, globose, or sub-globose 1-celled drupe. The Common or European Nettle-tree (*C. australis*) is a native of the south of Europe, the west of Asia, and the north of Africa. It grows to a height of 30 to 40 feet, and is a very handsome tree, often planted along public walks in the south of France and north of Italy. The wood is very compact, very durable, and takes a high polish. It was formerly much imported into Britain for the use of coachmakers, and is used in Italy by musical-instrument makers for flutes and pipes. The flowers are inconspicuous, axillary, and solitary; the fruit black, resembling a small wild cherry, not eatable till after the first frosts, and then very sweet. The kernel yields a useful fixed oil. The tree succeeds well in the south of England. *C. occidentalis* is a native of North America from Canada to Texas, and is also called the Nettle-tree, Sugar Berry, Hackberry or Hagberry, and Hoop Ash. Its leaves are much broader than those of *C. australis*, its fruit very similar. It is a much larger tree, attaining a height of 60 to 80 feet. There are several varieties, which are sometimes but needlessly classified as distinct species. The inner bark of *C. orientalis*, consisting of reticulated fibres, forms a kind of natural cloth, used by some tribes of India. A number of other species are natives of the warm parts of America and of Asia.

Neu-Brandenburg, a town of Mecklenburg-Strelitz, is situated on Lake Tollens, 20 miles NNE. of Neu-Strelitz by rail. Pop. 9134.

Neuburg, an ancient town of Bavaria, picturesquely situated on the right bank of the Danube, 29 miles NNE. of Augsburg. It has an old ducal schloss in the Renaissance style. Pop. (1880) 7485.

Neuchâtel, or NEUFCHÂTEL (Ger. *Neuenburg*), a canton in the west of Switzerland, between Lake Neuchâtel and the French frontier. Neuchâtel lies in the midst of the Jura Mountains, four chains of which, running from north-east to south-west, traverse the canton, and are separated by elevated longitudinal valleys. The greater number of the

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numerous streams which water the canton flow into the Rhine; several are feeders of the Lake of Neuchâtel, which, lying 1420 feet above sea-level, and 472 feet deep, is 25 miles long by from 3 to 6 wide. The Thiele serves as its outlet, and carries its waters into the neighbouring lake of Bienne, and thence into the river Aar. Pop. of the canton (1870) 97,284; (1888) 108,153, of whom three-fourths speak French, and four-fifths are Protestants. Asphalt and absinthe are exported; good wine and lace are made; but the speciality of the canton is watch-making, which occupies from 18,000 to 20,000 persons, and is prosecuted mainly in the homes of the work-people. The history of Neuchâtel was identical with that of Burgundy till the 11th century; and after the principality had been for a time incorporated with the territories of the Counts of Chalons, to whom it had been granted in 1288 by Rudolph of Hapsburg, it passed to the House of Longueville. In 1707, on the extinction of the Neuchâtel branch of the latter family, some fifteen claimants came forward to advance more or less valid pretensions to the Neuchâtel territory. Frederick I. of Prussia, who based his claim to the principality of Neuchâtel on the ground of his descent from the first Prince of Orange, a descendant of the House of Chalons, was the successful candidate; and from his time it continued associated with Prussia till 1806, when Napoleon bestowed it upon General Berthier; but in 1814 it was restored to the House of Brandenburg. A republican constitution was adopted in 1848, in spite of Prussian protest; and there was civil war in 1856. The connection with Prussia was wholly dissolved in 1857, and Neuchâtel is now a member of the Swiss Confederation. See SWITZERLAND.

NEUCHÂTEL, chief town of the canton, occupies a magnificent site on the north-west shore of the Lake of Neuchâtel, 85 miles by rail NNE. of Geneva. It is noted for its many charitable, educational, and artistic institutions, and has a château (restored 1866), a college (1828), a statue of Farel (1875), &c. There are manufactures of watches, jewellery, &c. Pop. (1870) 13,321; (1888) 16,504.—The famous Neufchâtel cream-cheeses are made, not here, but at Neufchâtel-en-Bray, a small Norman town, 25 miles SE. of Dieppe by rail.

Neuilly, or NEUILLY-SUR-SEINE, a town in the French department of Seine, immediately to the north of the Bois de Boulogne, and practically a suburb of Paris. Here, near the Seine, and in a large and beautiful park, formerly stood the Château de Neuilly, built by Louis XV., and the favourite residence of Louis-Philippe, which was burned at the revolution in 1848. When Louis-Philippe took refuge in England he assumed the title of Count de Neuilly. Pop. (1886) 25,596.

Neumünster, a prosperous manufacturing town of Holstein, on the Schwale, a head-water of the Stör, 20 miles by rail S. by W. of Kiel. It has large cloth-mills, dye-works, breweries, &c. Pop. (1875) 10,124; (1885) 13,659.

Neu-Pommern. See NEW BRITAIN.

Neuralgia (Gr. *neuron*, 'nerve;' *algos*, 'pain') is a term employed to designate pain of a purely nervous character, usually unaccompanied by inflammation, fever, or any appreciable change of structure in the affected part. The pain, which occurs in paroxysms, usually followed by complete remissions, is of every possible degree and character, being described in different cases as piercing, tearing, burning, &c. These paroxysms may occur at intervals of a few seconds only, or they may take place daily or on alternate days, or they may be separated by much longer intervals, which are often, but by no means always, of a regular length. The pain is usually felt not only at the place where the nerves terminate, but along their course. It is usually confined to one side of the body, and is very rarely, if ever, quite symmetrical. In prolonged cases 'tender points' are developed along the course of the affected nerves. After the pain has subsided the painful parts are usually tender to the touch. Very frequently the sensibility of the skin supplied by the affected nerve is somewhat diminished. With the pain there is frequently spasmodic twitching of the adjacent muscles. The duration of the disease is very uncertain. The patient may have only a single attack, or he may be liable to recurring attacks for months, years, or even for his whole life; it is, however, very seldom that the disease occurs but once. Death scarcely ever results directly from this affection, but the pain may, by its severity and persistence, gradually undermine the constitution.

The disease may attack any part of the body where there are nerves; but in no part does it occur so frequently as in the face, its seat being in the facial branches of the fifth pair of nerves (the trifacial nerves; see NERVOUS SYSTEM). The most severe form of facial neuralgia, happily rare, is known as *tic douloureux*. 'The absolute suddenness with which the pain comes on is one of its most remarkable characters. The patient is perhaps sitting quietly reading, when he jumps up from his seat, and rushes up and down the room with his hand forcibly pressed against his cheek. Or he may rock himself backwards and forwards in his chair, crying out or uttering deep groans. In ten or twenty seconds, or a minute at the longest, the paroxysm is over. It ceases as abruptly as it began.' 'The paroxysms may return every few minutes.' 'Sometimes remissions occur, the patient remaining free from the disease for several days together, or even for months. But presently it returns, and is as severe as ever.' 'A patient who suffers under tic douloureux acquires an expression of intense distress and suffering; his countenance is worn and wrinkled, and looks like that of a much older person' (Fagge, *Practice of Medicine*).

'The paroxysms of suffering in this frightful disease are apt to be brought on by apparently trivial causes—by a slight touch, by a current of air blowing upon the face, by a sudden jar or shake of the bed on which the patient is lying, by a knock at the door, or even by directing the patient's attention to his malady, by speaking of it or asking him questions about it. The necessary movements of the face in speaking or eating are often sufficient to provoke or renew the paroxysm. At the same time, firm pressure made upon the painful part frequently gives relief, and causes a sense of numbness to take the place of the previous agony' (Sir J. Watson).

Facial neuralgia of a less severe type than tic douloureux is very much more common, in fact it is by far the most frequent form of the disease; the reason probably being that the trifacial nerve, lying superficially, and being distributed over a part of the surface which is usually unprotected by any artificial covering, is very liable, for that reason, to be affected by exposure to atmospheric influences, which are undoubtedly to be included among the exciting causes of this disease. Amongst other seats of neuralgia may be mentioned the arm, especially the forearm, the spaces between the ribs, especially between the sixth and ninth, and the lower extremity, where it most frequently affects the sciatic nerve, giving rise to the affection known as Sciatica, which, however, not always being pure neuralgia, will be noticed in a separate article. The internal organs may also be the seat of neuralgia—e.g. the heart (some cases of Angina Pectoris, q.v.), stomach, or kidney.

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The causes of neuralgia are various. Excluding inflammation of the nervous trunk or *neuritis*, the pain may be excited by a tumour pressing on the nerve or originating in its substance, or by roughness of a bony surface with which the nerve may be in contact, as when it passes through a foramen. Sometimes, again, irritation applied to *one* branch of a nerve will give rise to pain at the extremity of *another* branch of the same nerve, the sensation being reflected along the branch which is not directly exposed to the irritation. Thus, facial neuralgia very frequently depends upon diseased conditions of the teeth, even if they themselves are not painful. In this way we may explain the pain in the shoulder which often accompanies disease of the liver; the pain in the thigh, which is often associated with irritation of the kidney; the pain in the left arm, which is often coincident with disease of the heart, &c. Persons suffering from debility, anæmia, and a gouty or rheumatic constitution are so especially liable to neuralgia that these conditions, as also exposure to malarious influences, must be placed among the predisposing causes. Amongst the exciting causes exposure to cold and wet, or to a cold dry east wind, is the most frequent; but fatigue, strong mental emotions, the abuse of tea, coffee, tobacco, and alcoholic drinks, a wound or bruise, the retrocession of gout, rheumatism, or cutaneous eruptions, &c. occasionally suffice to excite the disease.

The resources of the materia medica have been exhausted in searching for remedies for this cruel disease. But, in the first place, a careful search must be made for any possible local source of irritation; and next, 'hygienic conditions must be very carefully attended to; fresh air, regular bodily exercise, freedom from worry and overstrain of mind, plenty of sleep, an abundant supply of wholesome nourishment, are each essential' (Fagge). Fatty food, as cod-liver oil, butter, cream, is of especial importance.

Of drugs which give immediate relief to the pain, morphia, especially when administered hypodermically (q.v.), holds the first place. But it must be used with great caution, and not entrusted to the patient himself, lest a 'morphia habit' become established. Antipyrin and exalgin, coal-tar derivatives recently introduced into medicine, sometimes take the place of morphia, and are free from some of its disadvantages. Croton-chloral and gelsemium are often useful in facial neuralgia. Relief from the suffering is often the first step towards recovery.

But in most cases some treatment is necessary to remove the constitutional state on which the neuralgia depends. Iron, quinine (especially when the pain recurs at regular intervals), arsenic, phosphorus, chloride of ammonium, are the medicines most generally useful. But the treatment must of course be adapted to the disorders, frequently digestive, present in each particular case.

Local applications can be of no permanent service in cases where the pain results from organic change, or from general constitutional causes; they will, however, often give considerable temporary relief. Amongst the most important local applications may be mentioned laudanum, tincture of aconite or aconitina ointment, belladonna-plaster, and chloroform (which should be applied upon a piece of linen saturated with it, and covered with oiled silk to prevent evaporation), mustard leaves or poultices, and small fly-blisters. Galvanism is also valuable.

Lastly, neuralgia, being a purely nervous affection, is often influenced by means calculated to make a strong impression on the mind of the patient; and hence it is that galvanic rings, electric chains, mesmeric passes, and other applications which, like these, act more upon the mind than upon the body of the patient, occasionally effect a cure.

In cases which have resisted all other modes of treatment, surgical measures are sometimes necessary—viz. acupuncture, nerve-stretching (see under SCIATICA), or, in the last resort, removal of a portion of the affected nerve.

Neuritis, a term applied to inflammation of the nerves. The disease is not very common, and not very well defined. The symptoms are those of neuralgia, with impairment of sensation, or localised paralysis, according as sensory or motor nerves are affected.

Neuroptera. See INSECTS.

Neusatz, a town in the Hungarian province of Bács, on the left bank of the Danube, opposite Peterwardein (q.v.). Pop. 21,381.

Neusiedler Lake, a small lake on the north-west frontier of Hungary, 22 miles SE. of Vienna. It is shallow (13 feet), and has lost much of its former area (133 sq. m.) by the draining of the adjoining marshes—from 1865 to 1870 it was dry. Its brackish waters are valuable as medicinal baths.

Neuss, an ancient manufacturing town of Rhenish Prussia, near the left bank of the Rhine, 4 miles W. of Düsseldorf by rail. Its church of St Quirinus, a notable specimen of the transition from the round to the pointed style, was founded in 1209. Neuss has flourishing ironworks, foundries, flour and iron mills, and manufactures of cottons, woollens, leather, paper, chicory, &c. Pop. (1875) 15,563; (1885) 20,036.

Neustadt, a town of Prussian Silesia, 25 miles SW. of Oppeln. It is the seat of considerable industry, woollen and linen fabrics and carpets being the staple manufactures. Pop. (1875) 12,515; (1885) 16,093.

Neustadt, or WIENER-NEUSTADT, one of the most beautiful towns of Lower Austria, is situated 32 miles S. of Vienna by rail. The town is overlooked by the large old castle of the Dukes of Babenberg, now a military academy. The castle contains a fine Gothic chapel (1460), rich in painted windows; it is the burial-place of the Emperor Maximilian I. The old church dates from 1230, and was restored in 1890; a Cistercian abbey (1444) and a town-house are notable buildings. Locomotives and machinery, wire, bells, pottery, starch, leather, and ribbons are amongst the manufactures. The city, called 'the Ever-faithful,' was founded in 1192, and was rebuilt after a great fire in 1834. Pop. 23,735.

Neustadt-an-der-Hardt, a town of Rhenish Bavaria, at the foot of the Hardt Mountains, 20 miles W. of Spires. Its church, with several curious monuments, dates from the 14th century. It manufactures paper, cloth, soap, wine, brandy, &c. Pop. (1875) 10,224; (1885) 12,255.

Neustrelitz, capital of the grand-duchy of Mecklenburg-Strelitz, pleasantly situated in a hilly district, between two lakes, 62 miles NNW. of Berlin. Founded in 1733, it is built in the form of an eight-rayed star, and contains the ducal palace, with magnificent gardens. Pop. 9366.

Neustria, the name given in the times of the Merovingians and Carlovingians to the western portion of the Frank empire, after the quadruple division of it which took place in 511. Neustria contained three of these divisions. It extended originally from the mouth of the Scheldt to the Loire, and was bounded by Aquitania on the S., and by Burgundy and Austrasia (*Francia Orientalis*) on the E. The principal cities were Soissons, Paris, Orleans, and Tours. See the historical maps at EUROPE.

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Neutral Salts. See SALTS.

Neutrality. Neutrals are states which in time of war take no part in the contest, but continue pacific intercourse with both belligerents. The aim of the doctrine of neutrality is to reconcile the right of belligerents to carry on their warlike operations with the no less undeniable right of other nations to pursue peacefully their ordinary business. For many years after the rise of modern international law the conduct of warfare was discussed only with reference to belligerents, and no intermediate relation between an ally and an enemy was recognised. Not, indeed, till the middle of the 18th century did the terms 'neutral' and 'neutrality' come into general use; for not till then was a systematic effort made to regulate the relations of belligerents to nations standing aloof from the war, or to define their reciprocal rights and duties.

As between belligerent states and neutral states, the principles whence spring the complicated rules of modern neutrality are in themselves extremely simple. On the one hand, the neutral, being neither judge nor party, must show absolute impartiality in his dealings with both belligerents; on the other hand, the belligerent must pay scrupulous respect to the sovereignty of his neutral neighbours. Accordingly, throughout a war, neutrals continue diplomatic intercourse with both belligerents. A neutral state is not permitted to give armed assistance to either belligerent, even though such aid may have been promised before the war; nor to lend money to either side or guarantee such loan; nor to allow the passage of belligerent troops through its territory. A neutral is bound to prevent and cancel all acts of hostility, either in the neutral territory itself or in the adjacent waters, and to prohibit the exercise of any belligerent jurisdiction therein. So, if an attempt be made by troops of either belligerent country to traverse neutral territory, the neutral state is bound to disarm and intern such troops, and to set at liberty all prisoners of war found within its borders. Should a neutral state deviate from its duty in any of these particulars, the state injured is entitled to treat such deviation as a just cause of war. On the other hand, a belligerent is not permitted to carry on hostilities within neutral territory; nor to use neutral harbours for the purpose of fitting out expeditions against his enemy. He must scrupulously observe all the regulations of neutral states regarding the admission of cruisers or prizes into their ports.

The relations of belligerent states to the private citizens of neutral states involve greater difficulties. On land the property of neutral individuals is, of course, protected from belligerent attack; to this rule an exception is furnished by the Right of Angary (Low Lat. *angaria*, 'forced service'), under which a belligerent may seize the property of a neutral found in the territory of the other belligerent, and make use of it for the purpose of warlike operations, subject to his paying compensation. At sea, however, the commercial interests of belligerent and neutral merchants are so interwoven that it is difficult to separate them and strike at an enemy without injuring a friend; hence ever and again have arisen bitter controversies regarding the extent of a belligerent's power over the property of neutral citizens at sea. Two distinct principles for regulating the maritime capture of neutral property have at different times prevailed. By the one principle, the nationality of the ship determined liability to capture, so that neutral goods on hostile ships were liable to confiscation, while hostile goods on neutral ships went free. By the other principle, the nationality of the property determined its liability, so that neutral goods went free even though found on hostile ships, and hostile goods were liable to seizure even though found on neutral ships. In 1856 the Declaration of Paris finally settled the question by providing (1) that the neutral flag should cover an enemy's goods, except contraband of war; (2) that neutral goods, except contraband of war, should not be liable to capture even under the enemy's flag. The law, as thus settled, is the old rule, 'Free ship, free goods,' without the corollary, 'Hostile ship, hostile goods.' Attempts had frequently been made at an earlier period, particularly by Prussia in the Silesian Loan controversy and by the Armed Neutralities of 1780 and 1800, to incorporate the rule into international law; it was, indeed, mainly through the opposition of Great Britain that its final acceptance was postponed till 1856.

To the general rule of maritime capture, as thus determined, several important exceptions must be noted. Belligerents continue to have the right of intercepting, even on board of neutral vessels, such articles as are deemed contraband of war. The test to be taken in deciding what goods are contraband has been much discussed and is now quite unsettled (see CONTRABAND). The vessel, too, carrying the goods may be condemned along with its contraband cargo, where both belong to the same owner, or where false papers are found, or any other fraudulent device is resorted to. Another instance in which a belligerent is entitled to interfere with the ships and property of neutral individuals is furnished by the law of blockade (see BLOCKADE). Again, if during a war ships belonging to neutral citizens perform certain classes of services on behalf of one of the belligerents, the other belligerent is entitled to confiscate these ships. Among such hostile services, against which a belligerent is entitled to protect himself, are reckoned the transmission of naval signals or messages, the carriage of military and naval despatches, and the transportation of belligerent officers or troops. Where a citizen of a neutral state engages in any forbidden ventures—whether it be carrying contraband goods, running a blockade, or doing other un-neutral service—the aggrieved belligerent does not complain to the neutral state, but strikes at the neutral citizen directly by capturing his property and condemning it in his own prize court. The neutral state does not appear in the matter at all, unless the penalty imposed by the prize court be such as is not warranted by international law; in this case the neutral state claims reparation for its injured subject from the offending belligerent.

The most unsettled part of the modern law of neutrality is that dealing with the obligations, imposed on a neutral state, of restraining the conduct of its own citizens and of enforcing the due observance of neutrality on all persons within its jurisdiction. In recent times the tendency has been towards a large extension of the duties of neutral states in this respect. The movement was commenced by the Neutrality Act of the United States, passed in 1794, and re-enacted, with additions, in 1818. The principles of these American statutes have been closely followed in the series of British Foreign Enlistment Acts, passed with a view of arming the British government with sufficient power to enable it to fulfil the extended obligations of neutrality. Among the more important offences against neutrality which are now struck at by the municipal law of most states are such acts as the following: To leave the neutral territory in considerable numbers for the purpose of enlisting in the service of a belligerent; to accept letters of marque from a belligerent; to fit out within its

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territory armed expeditions against a belligerent, or increase therein the warlike force of any belligerent ship or expedition. At the same time a neutral state is not bound to restrain its subjects from trade in arms and munitions of war. The extent of the responsibility of neutral states for the building and fitting out of ships within their territory appears still to be uncertain. Till lately the English idea seems to have been that the neutral government was under no obligation to stop such proceedings, unless the vessel was ready to commence hostilities at the moment of its leaving neutral waters. But the events connected with the escape of the *Alabama* (see ALABAMA) and her sister-cruisers during the American civil war showed the inadequacy of this view. The treaty of Washington, 1871, by which all these questions were referred to arbitration, directed the arbitrators to apply, in addition to the ordinary rules of the law of nations, three new rules, known as the Rules of Washington. These rules, owing to their loose phraseology, have raised more questions than they have solved, but their general effect is immensely to extend the duties of neutral states.

See Hall, *International Law* (2d ed. 1884) and *The Rights and Duties of Neutrals* (1874); Wheaton, *International Law* (Eng. ed. by A. C. Boyd; 3d ed. 1889). For the history of the growth of the law of neutrality, see Manning, *Law of Nations*. See also the *Letters* of Historicus, and the works cited at ENEMY.

Neuville, ALPHONSE MARIE DE, the most popular of the youngest school of French painters of battle-scenes, was born at St Omer on 31st May 1836, and after studying under Delacroix painted a series of successful pictures illustrative of French exploits in the Crimean war, Italy, and Mexico. Then came the war with Germany. Neuville fought in the ranks and learned something of real warfare from actual experience. This knowledge imparted additional power to his next and last series of works, depicting incidents of that war. The attack at Rorke's Drift and that at Tel-el-Kebir were also chosen by him as subjects for pictures. Neuville excelled moreover as an illustrator of books, his best work in this line being the designs for Guizot's *Histoire de France*. He died in Paris, 20th May 1885.

Neuwied, a town of Prussia, on the right bank of the Rhine, 8 miles below Coblenz, was capital of the mediatised principality of Wied; the castle of the princes has a beautiful garden, in which are many Roman antiquities discovered here. The town contains an important institute of the Moravian Brethren, and there are some minor manufactures. Pop. 9656.

Neva, a river of Russia, flows westward from the south-west corner of Lake Ladoga to the Bay of Cronstadt, in the Gulf of Finland, passing through St Petersburg, and carries to the sea an enormous volume of water (greater than that of the Rhine) from the lakes Ladoga, Onega, Ilmen, and others. Its total length, with windings, is about 40 miles; in places it is over 4000 feet wide, elsewhere the channel is narrowed to 180 feet; and in one or two places the navigation is embarrassed by reefs and rapids. It is frozen on an average from November 25 to April 21. By the Ladoga Canal the Neva communicates with the vast water-system of the Volga, and thus it may be said to join the Baltic with the Caspian Sea.

Nevada, one of the Pacific states of the American Union, is bounded N. by Oregon and Idaho, E. by Utah and Arizona, and S. and W. by California. Its greatest length from north to south is a little less than 500 miles, and its greatest width from east to west is more than 300 miles. In area (110,700 sq. m.) it is the fourth largest state of the Union; in population it is the lowest of all the states and territories—(1870) 42,491; (1880) 62,266; (1890) 45,761. Nearly the whole of Nevada is included in the Great Basin (q.v.), once occupied by a great inland sea, and afterwards by several great lakes which have also disappeared. Some of the deepest depressions of such a body of water are yet marked by Walker, Humboldt, Carson, Pyramid, and Winnemucca lakes, and by other 'sinks' and *playas*. The ancient shore-lines are clearly visible in certain places, and the climate, now arid and nearly rainless, was once moist. The soil of the Great Basin at some time produced an abundant vegetation, whereas it is now almost totally unfit for agriculture, frowned upon by barren treeless mountains, and traversed by regions of nearly absolute desert. At present Nevada is a high plateau with an average altitude of 4000 feet, crossed by numerous ranges of mountains which as a rule are parallel and separated by valleys from 5 to 20 miles in width. Some of these valleys are barren and desolate; others, through which the rivers flow, have areas of arable land. The mountains contain rocks of every geological period; many of them are volcanic, and there are striking exhibitions of metamorphic and trap rocks. In the valleys lie the sedimentary deposits of ages mixed with cinders and other volcanic products which fell in many cases on the surface of the extinct lake, and at the mouths of the cañons are vast moraines. The mineral production of Nevada, especially of silver, has been enormous (see COMSTOCK LODE). Though the high grades of ore appear to have been largely exhausted, the production was at first so great as to materially change the value of the precious metals, and to promote Nevada hastily from an uninhabited desert to a state of the Union. Mining is still the chief interest. A small area in the north is drained by the Owyhee River, a tributary of the Snake, and another portion of the state in the south belongs to the Colorado valley. Otherwise Nevada lies wholly in the great basin of interior drainage, where none of the water reaches the sea. The streams disappear in the sand or flow into 'sinks,' salt or brackish lakes, or *playas*, which are shallow mud lakes that evaporate when the supply of water fails. The Humboldt River pursues a winding course of 350 miles. There are numerous hot springs, many of which are surrounded with incrustations of tufa often in weird and fantastic forms. Some of the lakes are nearly saturated solutions of borax and salts of sodium and potassium, and in the valleys are tracts of glistening alkaline deposits, which mark the beds of extinct lakes.

The atmosphere is dry, remarkably clear in winter, but filled in summer with minute particles of dust, which produce endless and extraordinary effects of colour on the sunlight. The temperature is subject to extremes, and the rainfall is exceedingly light. It nowhere exceeds 15 inches, and scarcely averages more than 5 inches. Some sections receive no rain for several successive years. Sage-brush and other desert plants capable of enduring drought form the native vegetation. It has been estimated that with careful irrigation about three per cent. of the land may be successfully cultivated. The Mormons established a few temporary camps in 1848, and in 1850 a settlement was made at Genoa; but the real history of the state begins with the discovery of silver in 1859. Nevada was separated from Utah territory in 1861, and in 1864 was admitted to the Union as a state. There are thirteen counties in the state, and the most important towns are Virginia City and Gold Hill,

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which are contiguous and situated on the Comstock lode, and Carson, the capital. Within the state there are over 900 miles of railway. The public schools are under the control of a state board of education, and there is a state university at Reno. There are nearly 9500 Indians in the state, mostly Pah-Utes and Shoshones, and the schools on the reservations are well attended.

Nevers, the capital now of the French department of Nièvre, and formerly of the province of Nivernais, is picturesquely seated on a hillside, 600 feet above sea-level, at the influx of the Nièvre to the Loire, 159 miles by rail SSE. of Paris. The *Noviodunum* of Cæsar, it has been the seat of a bishop since 506; its beautiful cathedral, restored in 1879, belongs mainly to the 13th century. The stately *palais-de-justice*, dating from 1475, was formerly the castle of the Dukes of Nevers; and there are also a fine public garden, a bridge of fourteen arches over the Loire, a mediæval gateway, and a triumphal arch (1746) commemorating Fontenoy. The industries comprise the manufacture of cannon, iron cables and chains, porcelain (introduced by Italians about 1565), &c. Pop. (1872) 22,276; (1886) 23,610.

Neviansk, a town of Russia, in the government of Perm, 50 miles N. of Ekaterinburg by rail, stands on the Siberian side of the Ural Mountains, and on a tributary of the Tobol. The district around Neviansk is famous for its mineral wealth, particularly gold and iron. Pop. 16,066.

Neville's Cross. See BRUCE, DAVID.

Nevis, an island of the West Indies, belonging to Great Britain, forms one of the Leeward Islands, and lies 2 miles SE. of St Christopher, with which it has been since 1882 administratively connected, sending three (unofficial) members to the common legislative council. It is circular in form, rises in the centre to a wooded ancient crater (3200 feet), and has an area of 50 sq. m. The lower slopes are cultivated, the sugar-cane being the principal crop, though limes and oranges are grown to a small extent. Statistics are given under St Christopher (q.v.) Pop. (1881) 11,864. The capita is the port of Charlestown (pop. 1500). Nevis was discovered by Columbus in 1498 and colonised by England in 1628. As long as the slave-trade lasted it was one of the principal marts for slaves in the West Indies. The island has suffered much at various times from hurricanes and earthquakes.

Nevis, BEN. See BEN NEVIS.

New Albany, capital of Floyd county, Indiana, is on the north bank of the Ohio River, nearly opposite Louisville. By rail it is 317 miles S. by E. of Chicago and 267 miles E. of St Louis. The city is well built, and is the principal manufacturing town in the state. It contains iron and brass foundries, rolling-mills, potteries and brick-yards, flour, woollen, cotton, and planing mills, &c.; while its plate-glass works are the largest in the United States. Pop. (1880) 16,423; (1890) 21,050.

New Almaden. See ALMADEN.

New Amsterdam. See NEW YORK.

Newark, (1) a port of entry and the capital of Essex county, New Jersey, is on the Passaic River, 9 miles by rail W. of New York. It is a handsome city, with several beautiful little parks and wide streets shaded with lines of elms. It has a city hall, court-house, public library, and nearly 150 churches, but is mainly noteworthy for its manufactures. There are altogether 400 industrial establishments in Newark, producing brass and iron work, hardware and machinery, carriages, trunks, saddlery, boots and shoes, hats, clothing, jewellery, &c. Four railways provide frequent communication with New York, which is maintained also by river-steamers; the line of docks is over a mile long. Newark was settled in 1666 by a colony from Connecticut, and received a city charter in 1836. Pop. (1850) 38,983; (1870) 105,059; (1890) 181,830.—(2) Capital of Licking county, Ohio, on the Licking River (here crossed by four iron bridges), 33 miles by rail E. by N. of Columbus. Stoves and furnaces, boilers, machinery, wagons, flour, woollens, and glass-ware are among its manufactures. Pop. (1880) 9600; (1890) 14,270.

Newark-upon-Trent, a town of Notts, on a navigable branch of the river Trent, 18 miles by rail NE. of Nottingham and 120 N. by W. of London. It is approached from the north by a causeway, 1¼ mile long, constructed by Smeaton in 1770, and carried over the flat island formed by the Trent on the west and the Newark branch on the east. The fine parish church, built mainly between 1350 and 1489, has an octagonal spire 223 feet high, and contains a good brass of 1361. Other edifices are the town-hall (1805), corn exchange (1848), hospital (1881), coffee-palace (1882), free library (1882), and grammar-school, founded by Archdeacon Magnus in 1529. Newark has a very important corn-market and great malting industries, besides iron and brass foundries, manufactures of boilers and agricultural implements, and plaster of Paris works. Incorporated by Edward VI., it returned two members to parliament till 1885. Pop. (1851) 11,230; (1891) 14,457. A British town and Roman station, Newark in Saxon times became the seat of a castle, which was rebuilt in 1125 by Alexander, Bishop of Lincoln (hence the name *New Wark*), and which long bore the name of the 'key of the north.' King John died in it (1216); and in the Great Rebellion it stood three sieges, in the second of which it was relieved by Prince Rupert (1644), whilst in the third it was surrendered to the Scots by order of Charles I., who had just delivered himself up (5th May 1646). It was then dismantled, and is now represented only by a very picturesque ruin, round which a public garden is maintained by the corporation. See works by Shilton (1820) and Cornelius Brown (1879).

New Bedford, a city and port of entry of Massachusetts, is on the Acushnet estuary (here crossed by a bridge 4000 feet long), 3 miles N. of Buzzard's Bay and 56 miles by rail S. of Boston. Many of its private residences are very handsome, while the public buildings include a city hall of granite, a custom-house, 30 churches, a public library, and a fine high school ($126,000). There is a broad drive (4 miles) round Clark's Point, at the extremity of which there is a strong granite fort. For a century (1755–1854) New Bedford was the chief centre of the American whale-fisheries, sending out more than 400 whaling-vessels, and receiving 60,000 barrels of sperm and 120,000 of whale oil in a year; but this industry has since declined, till now only some 80 whaling-vessels belong to the port, and the people have turned their attention mainly to manufactures. Besides several great cotton-mills (nearly 500,000 spindles), the city contains foundries, oil-refineries, and manufactories of drills, cordage, boots and shoes, flour, glass, plated ware, carriages, candles, &c. Pop. (1880) 26,845; (1890) 40,735.

New Berne, a city and port of entry, capital of Craven county, North Carolina, is situated at the junction of the navigable Neuse and the Trent (here crossed by a long bridge), 107 miles by rail SE. of Raleigh. It exports tar, turpentine, and lumber, and early vegetables for the North. It manufactures railroad-cars and cotton-seed oil, and has also a wood-pulp factory, sawmills, and an oyster-canning establishment. Pop. (1890) 7832.

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Newbery, JOHN, a London bookseller, intimately associated with Dr Johnson, Goldsmith, Christopher Smart, Smollett, and many other men of letters, was descended from an old bookselling family, and born a farmer's son, in the Berkshire parish of Waltham St Lawrence, about midsummer 1713. He had first a shop for general wares at Reading, and about 1744 settled in London as a vendor of books and such medicines as Dr James's Powder—the panacea of Horace Walpole as of Goldsmith. He was the first to publish little books for children such as have ever since been popular, and he was himself, in conjunction with Giles and Griffith Jones (1722–86), and perhaps Goldsmith, part author of some of the best of the series, as the histories of Goody Two-Shoes and Giles Gingerbread and the Travels of Tommy Trip. He published many books of a more useful character, a complete list of which is given in Mr Welsh's careful volume. In 1758 he started the *Universal Chronicle, or Weekly Gazette*, in the numbers of which the celebrated *Idler* was first printed. The *Public Ledger*, commenced in 1760, has continued to our own day —in its early numbers appeared Goldsmith's *Chinese Letters*, later reprinted as *The Citizen of the World*. His death took place 22d December 1767. He had a genius for advertising, even to an ingenious method of bringing in allusions to his books and wares in the text of his stories. Johnson sketched him humorously as 'Jack Whirler' in No. 19 of the *Idler*. It was to Francis Newbery (1743–1818), his nephew and ultimate successor, that Boswell tells us Dr Johnson told him he sold for sixty pounds the manuscript of Goldsmith's *Vicar of Wakefield*, in which John Newbery has been immortalised as 'the philanthropic bookseller in St Paul's Churchyard, who has written so many little books for children. He called himself their friend, but he was the friend of all mankind.' This transaction has occasioned much difficulty, as Boswell himself gives no date, while the accounts of Mrs Piozzi and Hawkins differ very materially, and Mr Welsh has discovered that B. Collins of Salisbury on October 28, 1762, paid Goldsmith £21 as one-third price of the book. Boswell describes the book as then 'ready for the press;' Mrs Piozzi says Johnson procured the distressed author 'some immediate relief;' Hawkins says the price that Johnson brought him was £40. The year of the sale by Dr Johnson was most likely 1762, when the greater part of the book was written; and it is most probable that Johnson did not mean that he brought the whole sum, but only an instalment of it. See Charles Knight's *Shadows of the Old Booksellers* (1865); and *A Bookseller of Last Century*, by Charles Welsh (1885).

New Brighton, a post-village of New York, beautifully situated on the north-east shore of Staten Island, 6 miles SW. of New York city. Its houses are mostly villa residences, though it possesses dye-works, a paper-factory, &c. Steamers run hourly to the metropolis. Pop. (1890) 16,423.

New Britain, a manufacturing town of Connecticut, 9 miles by rail SW. of Hartford, engaged in the production of hardware, cutlery, locks, jewellery, hooks and eyes, hosiery, &c. It is a pleasant city, with two large parks, and contains the state armoury and normal school. The water-supply is from a reservoir of 175 acres. Pop. (1880) 11,800; (1890) 19,010.

New Britain, by Germans called NEU-POMMERN, an island of the Western Pacific, separated from the north-east coast of New Guinea by the Dampier Strait. The interior is almost wholly unknown. In the forest-clad interior there are several volcanoes, active and quiescent, the highest being the Father (3900 feet). The climate is hot and moist. Cocoa-nuts, yams, bananas, bread-fruit, betel-nuts, and similar fruits are the chief products. Fish are caught in great numbers. The natives, cannibals, of the Melanesian division, are warlike, but suspicious and crafty. They make handsome canoes, with sails and outriggers, earthenware vessels, baskets, mats, &c. The sling, stone axe, and spear are their favourite weapons. They worship good and evil spirits. Area, 9600 sq. m. The population of the several islands is not known.

See Romilly, *The Western Pacific and New Guinea* (1886); Powell, *Wanderings in a Wild Country* (1883); and Parkinson, *Im Bismarck-Archipel* (1887). For map, see NEW GUINEA.

New Brunswick, a province of the Dominion of Canada, is bounded on the N. and NW. by the province of Quebec, from which it is separated by the river Restigouche; on the N. by the Chaleur Bay; E. by the Gulf of St Lawrence and Northumberland Straits—the latter separating it from Prince Edward Island; S. by the Bay of Fundy and part of Nova Scotia; and on the W. by the state of Maine, the boundary with the latter being the St Croix and St John rivers. It has an area of 27,322 sq. m.—rather smaller than Scotland. Its coast-line is 500 miles in length, interrupted only at the point of juncture with Nova Scotia, where an isthmus not more than 11 miles broad connects the two provinces, and divides the waters of Northumberland Straits from those of the Bay of Fundy, across which isthmus is the Chignecto Ship-railway (1892). The surface of the country is generally undulating. There are low hills skirting the Bay of Fundy and the rivers of St John and Restigouche. A feature of the coast-line is the number of fine harbours, which have been of great value as a means for exporting the timber for which the country is famous.

Several important rivers traverse the province; among the principal is the St John, 450 miles in length, and navigable for vessels of 100 tons to Fredericton, the capital of the province, 90 miles from the sea. Above this point smaller vessels and steamboats ascend for 125 miles. The country drained by the St John and its tributaries comprises about nine million acres in New Brunswick, as well as eight million in Quebec and the state of Maine. The Miramichi River, 220 miles long and 7 miles wide at its mouth, is also navigable for some distance. The Restigouche is 3 miles wide at its entrance into the Chaleur Bay, and over 200 miles in length. The lakes are numerous, but of small extent, the largest being Grand Lake, 30 miles long and 3 to 7 miles wide, communicating with the St John River, 50 miles from the sea.

The population of the province at the census of 1881 was 321,129; of 1891, 321,294. In 1881 there were 109,091 Catholics, 81,092 Baptists, 46,768 Church of England, 42,888 Presbyterians, and 34,514 Methodists. The population included 93,387 persons of English origin; 101,284 Irish; 49,829 Scotch; 1401 Indian; 6310 German; French, 56,335. The principal cities and towns are St John (including Portland), (44,000), Fredericton, the capital (6700), Moncton (6000). The provincial government is administered by a lieutenant-governor, assisted by an executive council, a legislative council of eighteen, and a legislative assembly of forty-one members, elected by the people. The province sends ten members to the senate, and sixteen to the Dominion House of Commons.

Like that of many other parts of Canada, the climate of New Brunswick is subject to extremes of heat and cold. The mean temperature for the year 1885 was 40·3° F. at St John; the highest and lowest temperatures for the year being 81° and −15° respectively. If, however, the climate of a country is to be judged by its effects on animal

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life, that of New Brunswick may be pronounced one of the best in the world.

The revenue is largely made up of subsidies from the Dominion government and from what is called 'territorial revenue,' including the proceeds of land and timber sales. The educational institutions supported by law are the Provincial University, the training or normal school for teachers, and a complete system of free common schools.

The imports of New Brunswick for the year ending June 1889 were valued at $6,577,037, of which $2,420,885 came from Great Britain and $3,266,449 from the United States; the exports for the same year were $6,700,898, including $1,204,578 not the produce of New Brunswick. Timber was the principal item.

Agriculture is the chief industry in New Brunswick. Except in a portion of country adjacent to the coast of the Bay of Fundy, the soil is very fertile, and every kind of grain and roots produced in England is grown, as well as others. Attention has been paid to live-stock both by the government and private breeders; and recently the government has established a stock farm. The province, owing to its cheap coal and proximity to the markets of the world, has also many advantages as a manufacturing country. The principal articles manufactured are sawn lumber, leather, cotton and woollen goods, wooden-ware, paper, iron-castings, nails, and mill machinery, bolts and nuts, railway engines and carriages. There are indications of considerable mineral wealth, and a number of mines are being successfully worked. Shipbuilding is still extensively prosecuted, although it has been much interfered with by the substitution of iron and steel for wooden vessels.

Land may be obtained in the province by settlers on reasonable terms—in fact, practically free, if the conditions of settlement are carried out, requiring the improvement of the land to a small extent, reasonable cultivation, and residence for three years. Land is also put up to auction at an upset price of $1 per acre. Improved farms can be had in most parts of the province at reasonable prices; many farmers having moved to Manitoba and the North-west, as they can there start their families with less capital.

There is plenty of sport of all kinds in the province, and some of the finest trout and salmon fishing in the world is to be had. Close times for animals and birds are strictly observed.

It is generally held that New Brunswick, as a part of Nova Scotia, was ceded by France to Great Britain by the treaty of Utrecht in 1713. The boundaries of Nova Scotia, however, were not well defined at that time, and the country along the St John River remained a subject of dispute which was not finally settled until the treaty of Paris in 1763 conceding and guaranteeing to Great Britain, in full right, Canada with all its dependencies. When in 1755 the memorable expulsion of the Acadians from Nova Scotia took place many of these people retired to what is now known as New Brunswick, and settled along the upper St John River, the Miramichi, and in the eastern parts of the province. The first British settlers in the province emigrated from Scotland to the Miramichi district in 1764; and in 1783, at the close of the American revolution, when the exodus of the loyalists from the United States took place, a large body settled near the present city of St John and along the St John River. For the map, see CANADA.

New Brunswick, capital of Middlesex county, New Jersey, is at the head of navigation on the Raritan River, 31 miles by rail SW. of New York, and is the terminus of the Delaware and Raritan Canal. It contains a Roman Catholic cathedral, and nearly a score of other churches, and is the seat of Rutger's College (1771), connected with which is the theological seminary of the Dutch Reformed Church, as well as an observatory and a state agricultural college and model farm. New Brunswick is noted for its great india-rubber factories, and has also iron and brass foundries, and manufactories of hosiery, lamps, needles, paperhangings, &c. Pop. (1890) 18,603.

Newburgh, a royal burgh of Fife, near the Firth of Tay, 11 miles ESE. of Perth. It arose in connection with the neighbouring Benedictine abbey of Lindores (*c.* 1196); and in its vicinity also is the famous Cross Macduff. Pop. 2374. See A. Laing's *Lindores and Newburgh* (1876).

Newburgh, capital of Orange county, New York, is on the west bank of the Hudson (here 1¼ mile wide), 57 miles by rail N. of New York, amid the grand scenery of the Highlands. Its handsome edifices, villas, and gardens, rising 300 feet from the river, command a noble prospect. The city has, besides foundries, boiler-works, shipyards, and powder-mills, manufactures of woollen and cotton goods and carpets, leather, flour, soap, oil-cloth, brushes, paints, plaster, tiles, &c. Large quantities of butter, grain, flour, and coal are shipped here. Newburgh was the scene of the disbandment of the American army, 23d June 1783; and 'Washington's Headquarters' is preserved as the property of the state. Pop. (1890) 23,087.

Newbury, a thriving market-town of Berkshire, on the 'swift' Kennet, 17 miles W. by S. of Reading and 55 from London. Its gray old church, restored in 1867 at a cost of £15,000, is a fine Perpendicular edifice, with a noble tower added in 1510 by John Winchcombe or Smallwoode, otherwise 'Jack of Newbury,' a famous clothier, who sent a hundred of his own men to fight at Flodden. The large Italian corn exchange was built in 1862, in which year was started a great yearly wool-market; and still more recent are the handsome municipal offices and the new grammar-school, though this claims King John for its founder (1216). Newbury—'new' only as distinguished from the old Roman station of *Spinæ* (now Speen)—besides has many ancient and wealthy charities. It was incorporated by Elizabeth in 1596, and the borough boundary was extended in 1878. Pop. (1801) 4275; (1851) 6574; (1891) 11,002. Two hard-fought battles took place here in the Great Rebellion—the one between Charles and Essex, on 20th September 1643; the other between Charles and Manchester, on 27th October 1644. The advantage of the first was, on the whole, on the side of the king, but it cost the lives of Lords Falkland (q.v.), Carnarvon, and Sunderland, to whom a memorial was erected in 1878. The second would have been a decisive royalist defeat but for Manchester's hesitancy.

See the *History of Newbury* (1839), a work on the two battles by W. Money (1881), and his *History of the Ancient Town of Newbury* (Oxford, 1887).

Newburyport, a city and port of entry of Massachusetts, on the south bank of the Merrimac, 3 miles from its mouth, and 37 miles by rail NE. of Boston. A long, shady High Street, with a pond of six acres, is its chief ornament. Shipbuilding is carried on, and there are a number of large cotton and shoe factories, besides manufactories of combs, hats, pumps, &c. Here Whitefield, who died in 1770, is buried. Pop. (1890) 13,947.

New Caledonia, an island of the South Pacific Ocean, belonging to France, and lying midway between the Fiji Islands and the east coast of Queensland. The Loyalty Islands, Isle of Pines, and some others, with a total area of 1250 sq. m., are politically dependent upon New

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Caledonia. This principal island is about 240 miles in length, 25 in average breadth, and has an area of 6450 sq. m. The long axis runs from north-west to south-east; the interior is greatly broken by irregular mountain-chains (highest point, Mount Humboldt, 5380 feet); and the entire island is surrounded by coral-reefs. There are good harbours on the east coast, but the only one used is Noumea, the capital (4601 inhabitants), on the south-west coast. In the valleys the soil is fruitful, producing the cocoa-nut, coffee, maize, tobacco, fruits, &c. But the most valuable natural products are minerals, especially nickel, with copper, cobalt, antimony, chrome, &c. There are several useful timber-trees. Promising attempts have been made to introduce wheat, the vine, and the silkworm. Turtle and fish are abundant. Locusts frequently devastate the crops. Besides the smelting of the minerals, meat is preserved and sent to France, and some soap and tapioca are manufactured. Wines and spirits, flour, drapery, groceries, ironmongery, machinery, coal, &c. are imported to the annual value of £333,800, and nickel, cobalt, and other metals, silver coins, preserved meat, copra, coffee, &c. exported to the average value of £154,800. Every year about 123 vessels of 92,400 tons visit the island, one-half being British. The total population in 1885 numbered 56,463, thus made up —aborigines (Canaques), 35,650; French colonists, 6437; convicts, 7544; liberated convicts and political prisoners, 3814; officials and others, 3018. The island was discovered by Captain Cook in 1774, and was annexed by France in 1853. She began to use it as a convict station, and after 1871 sent out great numbers of political prisoners, mostly Communists. The aborigines are a mixture of two types, one resembling the Polynesians, the other the Papuans. They were formerly cannibals, and delighted in war, yet were hospitable, and skilful tillers of the soil. They live now chiefly on vegetable food. Leprosy is a scourge amongst them. See the French works on New Caledonia by Lemire (1878 and 1884), Rivière (1880), Chartier (1884), Cordeil (1885), and Moncelon (1886).

New Castle, capital of Lawrence county, Pennsylvania, on the Shenango River, 50 miles by rail NNW. of Pittsburg, contains a college, large rolling-mills, foundries, and manufactories of nails, furnaces, and flour. Pop. (1890) 11,581.

Newcastle, a port of New South Wales, 75 miles NE. of Sydney by rail, at the mouth of the Hunter River. It is the chief port of the north coast, its shipping nearly equalling that of Sydney; coal and wool are the main exports. The harbour, which is defended by a fort, is dangerous during storms from the ESE. Pop. (1881) 15,595; (1890) 20,000.

Newcastle, DUKES OF. See CAVENDISH and PELHAM.

Newcastle-under-Lyme, a parliamentary and municipal borough of Staffordshire, on the Lyme brook, 16 miles NNW. of Stafford and 147 by rail NW. by N. of London. Pop. (1801) 4604; (1891) 18,452. The aspect of the town has of late years been much improved by the widening of the main thoroughfares, and the erection of new public buildings, notably the town-hall (1890) and the high school (1876). The latter was reconstructed under a new scheme in 1874 from the amalgamation of various ancient charities (the earliest founded 1602); its distinctive features are the study of natural science and modern languages. The parish church, partly Early English and partly Decorated, was rebuilt in 1876 from designs of Sir Gilbert Scott, and has a quaint old square tower of red sandstone with pinnacles, and a fine peal of bells. The manufacture of hats was formerly a speciality of the town, but has of late years been discontinued; brewing, malting, and the making of paper and army clothing are now the principal industries, whilst the surrounding district is noted for its potteries, and numerous coal-mines are worked. Of the castle, from which the town derives its name, all traces have entirely disappeared; it was built by Edmund, Earl of Lancaster, the youngest son of Henry III. Newcastle, which confers the title of duke upon the family of Clinton, returned two members to parliament from 1353 to 1885, since which time it has only had one representative.

Newcastle-upon-Tyne, a city and county of itself, seated on the north bank of the Tyne, 275 miles from London, 117 from Edinburgh, and 10 from the German Ocean. It is the seat of a bishopric founded in 1882. The city is governed by a corporation consisting of a mayor, 16 aldermen, and 48 town-councillors, and it returns two members to parliament. Pop. (1801) 28,294; (1841) 71,850; (1881) 145,359; (1891) 186,345.

During the Roman occupation of Britain the high ground overlooking the river in the neighbourhood of the castle was the site of the military station of Pons Ælii. The 'Roman wall' would probably form its northern boundary. Soon after the abandonment of Pons Ælii by the Romans, the Angles took possession of it. Subsequently it appears to have been a monastic settlement, and at the time of the Conquest was known as Monkchester. Pandon, which until 1299 was a vill quite distinct from Newcastle, is supposed to have been the place where, about 653, Peada, son of Penda, king of the Mid Angles, and Sigebert, king of the East Angles, were baptised by Bishop Finan. When the Conqueror arrived at Monkchester in 1072 there was nothing to be seen of the bridge above water, and the town was too small or impoverished to victual his army. Robert Curthose, on his return from an expedition against Malcolm in 1080, constructed a fortress here, which was named the New Castle. The south postern is probably a fragment of his work. William Rufus is stated—on doubtful authority—to have rebuilt the castle, and to have granted to the inhabitants of the growing town many privileges and immunities. He besieged the castle in 1095. The present keep—one of the most perfect examples of a Norman stronghold in the kingdom—was built between 1172 and 1177 at a cost of £911, 10s. 9d., and the Great Gate of the castle—the Black Gate as it is now called—in 1247, at a cost of £514, 15s. 11d.

In the time of the first three Edwards the town was enclosed by a wall, 8 feet thick and over 12 feet high, which embraced in its circuit the monasteries of the Black, the White, and the Grey Friars, the Benedictine nunnery of St Bartholomew, together with the vill of Pandon. The levies for the Scottish wars were usually directed to assemble at Newcastle. In 1644 Newcastle, which had declared for the king, was besieged for ten months by the Scots under General Leslie. This loyal resistance of the town to the forces of the parliament is commemorated in the motto which it bears on its coat of arms 'Fortiter Defendit Triumphans.' Events of tragic importance in the annals of the town were the visitations of the Asiatic cholera in 1831 and 1853, and the great fire which destroyed so much of the old town in 1854.

The city occupies a striking and picturesque site, being built for the most part on steep slopes and gently rising ground. It abounds in contrasts, such as the grim old keep and the High Level Bridge; the modern Grey Street and the ancient Side; the stately stone buildings erected by Grainger and the half-timbered Elizabethan houses with projecting stories and latticed casements; the Elswick Works, a mile in extent, and Jesmond

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Dene, one of the loveliest ravines in the country; the closely-packed hillsides and the rolling expanse of common called the Town Moor.

The principal remains of antiquity in Newcastle are the Norman keep; the Black Gate; the cathedral of St Nicholas; the churches of St John and St Andrew; portions of the Edwardian walls, with the Durham, Heber, Mordaunt, and Plummer towers, and the Sally-port Gate; part of the Black Friars Monastery; fragments of the houses of the Austin Friars and the Friars of the Sac; and several mansions of the 16th and 17th centuries. The church of St Nicholas, now the cathedral, is said to have been founded by Osmund, Bishop of Salisbury, in 1091. This early structure was destroyed by fire in 1216. The present building belongs to the Decorated and Perpendicular periods; the nave and transepts dating from 1359, the chancel from 1368, and the tower with its beautiful architectural crown from about 1435. All that remains of the previous edifice is some masonry above the arcades, together with an Early English pillar built up in the north-east pier. The reredos, erected in 1888, is of fine unpolished Uttoxeter alabaster with splayed screens of Caen stone. In canopied niches around the central figure of Christ are statues of Northumbrian saints and the four evangelists. St John's Church, built in the latter part of Henry I.'s reign, contains much of the original Norman work, with Early English, Decorated, and Perpendicular additions. St Andrew's Church dates from about 1175 to 1185, and retains some interesting Transitional features. All-Saints' Church was rebuilt in 1786–90 on the site of the church of All-Hallows, founded in the 12th century. There are twenty-one other places of worship in the city connected with the Established Church; the Roman Catholics have four churches, one being the cathedral of St Mary, erected in 1844 from the designs of Pugin; and the various other religious bodies are represented by about sixty chapels and meeting-houses.

The central part of Newcastle with its stately and ornate buildings is a monument to the genius of Richard Grainger (1798–1861), a man of lowly origin, who, by his vast building schemes, quite changed the appearance of his native town. Grey Street and Grainger Street, built in 1834–38, are the finest thoroughfares in the city. Monuments have been erected to Earl Grey (1838) and George Stephenson (1862). The town-hall, built in 1863, stands near the cathedral. Associated with it are the corporation offices and the corn-market. Other public buildings are the guildhall and exchange on the Sandhill, the former (which occupies the site of the hospital of St Catharine) dating from 1658, the Moot Hall (1810), the general post-office (1876), the central police-courts (1874), the gaol (1823–28), the Wood Memorial Hall (1870), the Trinity House (chapel, *c.* 1651; hall, 1721; almshouse, &c., 1782–95), the Central Exchange News-room and Art Gallery (1838), the Assembly Rooms (1774–76), the (branch) Bank of England (1834), the Royal Arcade (1831–32), the Butchers' Market (1835), covering an area of 13,906 sq. yd., and the barracks (1806). There are two theatres in Newcastle. The museum of the Natural History Society was erected in 1883–84 at a cost of £42,000. It contains valuable collections of British birds, fossils from the coal-measures, and a unique series of Bewick's drawings. The Literary and Philosophical Society (1793) has a library of about 40,000 volumes. The public library (1881) contains over 68,000 volumes.

There are two useful collegiate institutions in Newcastle affiliated to the university of Durham—the College of Medicine (1851) and the College of Science (1871): the College buildings were opened in 1888 and 1889. The Royal Free Grammar-school, founded in 1525, has since 1870 occupied new premises off Westmoreland Road. Among the various benevolent institutions in Newcastle are the Royal Infirmary (1751), the Jesus Hospital (1681), the Keelmen's Hospital (1701), the Trinity Almshouses (incorporated 1492), the Northern Counties Institution for the Deaf and Dumb (1861), the Fleming Memorial Hospital (1887), and the Northern Counties Orphan Institution (1876).

The Central Railway Station in Neville Street (1850) is the terminus for all the trains entering Newcastle, with the exception of those on the Blyth and Tyne section of the North-Eastern Railway, which run to New Bridge Street Station. Tramways have been laid from the centre of the city to the chief suburbs. The public pleasure-grounds of Newcastle are the Town Moor (987 acres), Castle Leazes, and Nuns Moor, the Leazes, Elswick, Brandling, Heaton, and Armstrong Parks, the Cruddas recreation-ground, and Jesmond Dene. For the Armstrong Park and Jesmond Dene, Newcastle is indebted to the munificence of Lord Armstrong.

Newcastle is connected with Gateshead by three bridges: (1) the High Level Bridge, erected in 1846–49 from the plans of Robert Stephenson and T. E. Harrison, at a cost, with the site and approaches, of £491,153. It is 1337 feet long, and consists of six cast-iron arches, which, springing from piers of solid masonry, support a railway at a height of 112 feet and a roadway at a height of 83 feet above high-water (see Vol. II. p. 440). (2) The Swing Bridge, erected 1868–76, at a cost of £233,000, on the site of the Roman, mediæval, and 18th-century bridges. The movable portion, which weighs 1450 tons and is 281 feet long, is worked by hydraulic machinery, and can be swung round in 90 seconds. (3) The Redheugh Suspension Bridge, erected 1868–71, at a cost of £35,000, is 1453 feet in length, its height from high-water mark to the under side of the arch being 87 feet. Newcastle is well supplied with water. Hay and cattle markets are held on Tuesdays, corn-markets on Tuesdays and Saturdays. The port of Newcastle is a very ancient and important one. Since 1840 between 70 and 80 million tons of stuff have been dredged from the bed of the river, which is now navigable by large vessels to Elswick. Since the river came under the jurisdiction of the Tyne Commissioners improvements on a large scale have been made. The total number of vessels using the port during the year 1889 was 14,757, of a net register tonnage of 6,914,392. The quay, the great terminus of the river-traffic of the port, is about 1540 yards in length, and, as the depth of the river there at low-water is 20 to 22 feet, vessels of large size can be moored in safety. Since the 13th century the chief trade of Newcastle has been in coal. A charter was granted by Edward III. to the burgesses to dig for coal outside the walls in 1350. The output of the northern coalfield, of which Newcastle is the centre, in 1889 was 39,101,182 tons. During this period the number of persons employed in the collieries, &c. was 115,440. In 1889 10,529,401 tons of coal and coke were shipped from the port of Newcastle. One of the principal industries of Newcastle is shipbuilding, the river Tyne being second in order of production to the Clyde. In 1889 281,710 tons of shipping were launched on the river.

The principal manufactures of Newcastle are locomotive and marine engines, machinery, heavy ordnance, carriages and harness, white and red lead, sheet and pipe lead, glass of various kinds, earthenware, chemical manures, alkali, cement, bricks, tiles, and fireclay goods, colours, shovels, grindstones, wire rope, nails, sails, &c. The most important works at Newcastle are those of Sir

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W. G. Armstrong, Mitchell & Co., Limited, founded in 1847. They comprise blast-furnaces, engine-shops, foundries, and steel-works. Since the amalgamation of the original firm with that of C. Mitchell & Co., shipbuilders, at Walker, in 1882, several ships of war with their armaments have been completed at Elswick, the largest being H.M.S. *Victoria* of 10,000 tons. From the engine-works of R. Stephenson & Co. (founded by George Stephenson in 1824), and R. W. Hawthorn, Leslie & Co., locomotive and marine engines have been sent to all parts of the world. Newcastle is the birthplace of Lords Eldon and Collingwood, Mark Akenside, Charles Hutton the mathematician, and Lord Armstrong.

See Gray's *Chorographia* (1649); and the histories of the town by Bourne (1736), Brand (1789), an anonymous writer—supposed to be the Rev. John Baillie (1801), R. Mackenzie (1827), Welford (3 vols. 1884–87), R. J. Charleton (1885), and J. R. Boyle (1890).

New-chwang, a city of China, the principal port of the province of Manchuria, stands on the river Liao, 20 miles from its mouth and 120 from Mukden, the capital of Manchuria. By the treaty of Tientsin (1858) New-chwang was opened to foreign trade. But the accumulation of alluvial soil in the lower reaches of the river prevents vessels ascending it; they are obliged to load and discharge at Ying-tzu, at its mouth. It is there the Europeans are settled, and they call Ying-tzu by the name of the treaty-port New-chwang. This last is now a greatly decayed place. Ying-tzu imports cotton, woollen, and silk goods, sugar, paper, metals, opium, tobacco, &c., to the annual value of £577,700 (average of three years ending with 1889), and exports beans, silk, ginseng, skins, and horns to the annual value of £1,381,500. The import of Indian opium has fallen from £572,000 in 1866 to £9135 in 1889; the people now consume native Manchurian opium. The port is closed four or five months from November with ice. Large quantities of salt are manufactured in the vicinity. Since 1872 Scottish Presbyterian missionaries have been working here; there is also a Roman Catholic mission. Pop. 60,000.

Newcomb, SIMON, astronomer, was born at Wallace, Nova Scotia, 12th March 1835, graduated in 1858 at the Lawrence Scientific School, at Harvard, and in 1861 became a professor of Mathematics in the United States navy. He was appointed at once to the naval observatory at Washington, and in 1877 was placed at the head of the office of the official *American Ephemeris and Nautical Almanac*. He organised the government expedition to observe the transit of Venus in 1874, and in 1882 observed the transit of the same planet at the Cape of Good Hope; he had already been sent to Saskatchewan (1860) and to Gibraltar (1870–71) to observe eclipses of the sun. In 1884 he undertook, in addition, the duties of the chair of Mathematics and Astronomy in the Johns Hopkins University. His writings embrace over a hundred papers and memoirs, and include especially most exact tables of the motions of the planets. He has also published several volumes on political economy. Professor Newcomb has received doctorates from Columbian University (at Washington), Yale, Harvard, Columbia, Leyden, and Heidelberg, and numerous other honours, both in America and in Europe.

Newcomen, THOMAS, the inventor of a Steam-engine (q.v.), was born at Dartmouth in the later half of the 17th century, and died in London in August 1729. In 1705, along with Cawley, a Dartmouth glazier, and Savary, the manager of a Cornish mine, he obtained a patent for what is now known as the atmospheric steam-engine. Some six years later his invention was brought into use for pumping water out of mines.

Newdigate, SIR ROGER (1719–1806), was born and died at Arbury in Warwickshire, having sat for many years in parliament as member for Middlesex and the university of Oxford. He was a great antiquary, but now is chiefly remembered as the endower of the Newdigate prize poem at Oxford, winners of which have been Heber (1803), John Wilson (1806), Milman (1812), Hawker (1827), Lord Selborne (1832), Faber (1836), Stanley (1837), Ruskin (1839), Shairp (1842), M. Arnold (1843), Sir E. Arnold (1852), J. A. Symonds (1860), W. J. Courthope (1864), and W. H. Mallock (1871).

New England, a collective name given to the six Eastern States of the United States of America—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut—embracing an area of 65,000 sq. m. The people, distinctively known as Yankees, are celebrated for industry and enterprise. The joint population in 1890 was 4,692,904; this is more than one-thirteenth of the entire population of the republic, while the area of New England is less than one-fiftieth of the total area of the United States. For the influence of the Puritans who settled here, see Fiske, *The Beginnings of New England* (1889).

Newent, an old market-town 8 miles NW. of Gloucester. Pop. of parish, 2889.

New Forest, a triangular district of south-west Hampshire, 9 miles SW. of Southampton, bounded W. by the river Avon, S. by the Solent and English Channel, and NE. by Southampton Water. It measures about 14 by 16 miles, and has an extreme area of 144 sq. m., or 92,365 acres, of which, however, only 64,232 belong to the crown demesnes. The district seems to have been wooded from the earliest times; its present name dates from 1079, when the Conqueror here made a 'mickle deer-frith,' and cleared away several hamlets. This afforestation, enforced by the savage 'Forest laws,' was regarded as an act of the greatest cruelty; and the violent deaths met by two of his sons, Richard and William Rufus, of whom one was killed here by a stag, and the other by an arrow, were looked on as special judgments. The deer were removed under an act of parliament (1851); and under another of 1877 the New Forest now is managed by the court of Verderers as a public pleasure-ground and cattle-farm. Enclosed plantations occupy about one-fourth of the entire area, the remainder being open woodland, bog, and heath. The principal trees are oaks and beech. The former were once much used as timber for the navy; the mast of the latter still feeds large herds of swine. There is also a herd of small, rough-coated ponies. The hollies, the rhododendrons, and therewith the general absence of underwood, give a beautiful park-like aspect to the forest, points within which or on whose verge are Lyndhurst, Beaulieu, and Lymington.

See Gilpin's *Forest Scenery* (ed. by F. G. Heath, 1879); Blackmore's *Cradock Nowell* (1866); and J. R. Wise's *The New Forest* (1863; 4th or 'Artist's edition,' 1883), the last with W. J. Linton's sixty-three engravings of woodland views by Walter Crane, and twelve etchings by Heywood Sumner.

Newfoundland (*New'fundland'*), an island and British colony in North America, not yet incorporated with the Dominion of Canada, lies at the mouth of the Gulf of St Lawrence, separated from Labrador on the north by the Straits of Belle Isle (q.v., 11 miles broad), and extending in lat. from 46° 38′ to 51° 37′ N., and in long. from 52° 44′ to 59° 30′ W. In shape it resembles an equilateral triangle, of which Cape Bauld on the north, Cape Race on the south-east, and Cape Ray on the

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south-west form the angles. It is 370 miles in length, 290 miles in breadth, and has an area of 40,200 sq. m.—a fifth less than England. Pop. (1874) 168,958; (1884) 193,124. 'The coast of Labrador from the entrance of Hudson Strait to a line to be drawn due north and south, from Anse Sablon on the said coast to the fifty-second degree of north latitude, and all the islands adjacent to that part of the said coast of Labrador,' is claimed as constituting a dependency of Newfoundland. During the fishing season in each year about 30,000 inhabitants of Newfoundland visit Labrador, and live about its harbours, either on shore or in their vessels, for about three months in each year. The population of Newfoundland and Labrador amounted in 1884 to 197,335, of whom 75,354 were Roman Catholics, 69,000 members of the Church of England, and 48,767 Wesleyan Methodists. The able-bodied fishermen numbered 33,000, and about 21,000 women and children were also engaged in curing fish.

The island, as seen from the sea, presents a wild and sterile appearance. Its surface is diversified by mountains, ponds, and lakes. The mountains in the Avalon Peninsula (stretching south-east from the main portion of the island, and connected with it by an isthmus of only about 3 miles in width) rise in some cases to over 2000 feet above sea-level. The number of the lakes and 'ponds' is remarkable, and it has been estimated that about one-third of the whole surface is covered with fresh water. The coast-line is everywhere deeply indented with bays and estuaries. These bays vary in length from 25 to 70 miles, are of great breadth, and are lined—as indeed the whole coast is—with excellent harbours. The rivers are narrow and winding. Much of the soil is productive, and there is considerable cultivation along the seaboard of the settled districts, but careful exploration has shown that the best land and timber are in the river-valleys and upon the west coast. Large tracts of very good timber, chiefly pine and spruce, exist in several parts of the island. The great body of the people being employed either in the fisheries or in establishments connected with them, little attention used to be paid to the culture of the soil. In 1845 the only crops raised were oats and hay; but within recent years large supplies of grain, vegetable, and garden seeds have been imported; and now about 1,000,000 bushels of potatoes are produced annually, and turnips, hay, carrots, clover, barley, and oats are cultivated with success. The island possesses many minerals. The chief seat of copper-mining is around the shore of Notre Dame Bay. The ore is found in connection with the serpentine rocks, which are spread over an area of 5000 sq. m. Up to 1879 the value of copper and nickel ore exported was $4,629,889, or nearly £1,000,000 sterling. Gold has been found. Rich deposits of lead ore exist in several places. Gypsum has also been discovered in immense quantities, and marbles on both eastern and western shores. Roofing-slate is found in abundance. Coal and iron exist side by side near the west coast, but their development is unfortunately hampered by claims set up by the French to a right to use the strand for drying fish 'free from interruption' by the colonists. The same claims have seriously impeded mining operations in several parts of the island.

A great variety of valuable fish is found in the waters of the colony and its dependencies, but cod, herring, and salmon are the most important. The capture of seals and the canning of lobsters also add to the resources of the Newfoundlanders. About 250,000 seals are annually taken and their skins sent to Great Britain for manufacturing purposes; the 'fat' is made into seal-oil, which is used in manufacturing and for lubricating purposes. The industry of canning lobsters, though commenced since 1880, has an annual value of about $500,000. Several factories for canning lobsters have been erected by the French upon the coasts of Newfoundland over which they have certain rights, but the legality of this action is contested by the colonists, upon the ground that the lobster is not a 'fish' but a crustacean, and that canning lobsters is not 'drying fish.' The average annual value of the herrings exported and consumed in the country is about $600,000, and that of the salmon exported about $100,000.

The people chiefly depend for a livelihood upon the product of the cod-fisheries, of which there are three distinct branches—namely, the Labrador fishery, the shore fishery, and the bank fishery. The average annual value of the cod-fishery is $6,034,242. This calculation includes the dried cod-fish exported, the quantity consumed by the population, and the oil extracted from the fish. From 25,000 to 35,000 people and 1200 vessels engage in the Labrador fishery, and the annual export is valued at about $1,500,000. The shore fishery is prosecuted along the whole coast-line in Newfoundland, and is the mainstay of the very large portion of the population who from poverty, age, or disinclination refrain from going either to the Labrador or bank fishery, or divide their time between farming and fishing. The bank fishery is prosecuted upon the 'Banks,' so called, which lie to the southwards of Newfoundland. These 'Banks' are submarine plateaus extending over a tract averaging about 600 miles in length and 200 miles in breadth. The depth of water over the 'Banks' varies from 100 to 600 feet, and the most productive ground is known as the 'Grand Bank.' American, Canadian, and French fishermen also resort to these 'Banks' to fish, the French using their islands, St Pierre and Miquelon, as a base of operations. But it is necessary to procure fresh supplies of herring, caplin, and squid at frequent intervals for use as bait upon the 'Banks,' and this can only be obtained, at the seasons when most wanted, and without great delay and expense, in the southern bays of Newfoundland, chiefly in Fortune and Placentia bays. Newfoundland does not now allow the bait-fishes to be exported for bait except under licenses, for which a large fee has to be paid, and the result has been a considerable decrease of the catch upon the banks by foreign fishermen.

The revenue of the colony for the year 1888 was $1,730,029, and the expenditure $1,831,441, while the public debt was $3,335,589. In the same year the colony imported goods to the value of $7,420,400, of which Great Britain contributed $3,265,229, Canada $2,041,144, and the United States $1,660,000. The exports were valued at $6,523,137.

In 1882 a contract was made with a company for the construction of a railway from St John's to Hall's Bay, a distance of about 250 miles. After 85 miles of the railway—from St John's to Harbour Grace—had been completed the work of construction was suspended. In 1886 the government of the colony commenced, and in 1887 completed, a branch-line to Placentia. A contract was afterwards entered into with another company to complete the railway to Hall's Bay by 1895, and a project to construct a line from the east to the west side of the island has been revived. The Atlantic cables of the Anglo-American Cable Company land at Heart's Content, on the eastern side of Newfoundland, and at Placentia, on the western side. There are about 800 miles of telegraph in the colony.

The early history of Newfoundland is involved in obscurity. It was discovered 24th June 1497,

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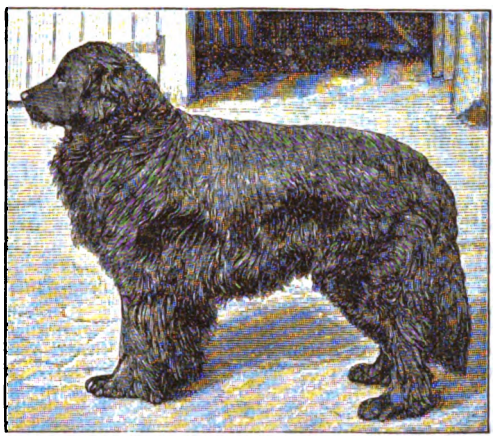
in the reign of Henry VII., by John Cabot, and the event is noticed by the following entry in the accounts of the privy-purse expenditure: '1497, Aug. 10. To hym that found the New Isle, £10.' It was visited by the Portuguese navigator, Gaspar de Cortereal, in 1500; and within two years after that time regular fisheries were established on its shores by the Portuguese, Biscayans, and French. In 1578, 400 vessels, of which fifty were English, were engaged in the fishery. Sir Humphrey Gilbert (q.v.), with his ill-fated expedition, arrived in St John's Harbour, August 1583, and formally took possession of the island in the name of Queen Elizabeth. In the return voyage the expedition was scattered by a storm, and the commander lost. In 1621 Sir George Calvert (afterwards Lord Baltimore) settled in the great peninsula in the south-east, and named it the Province of Avalon. The history of the island during the 17th and part of the 18th centuries is little more than a record of rivalries and feuds between the English and French fishermen; but by the treaty of Utrecht (1713) the island was ceded wholly to England, the French, however, retaining certain privileges in connection with the catching and drying of fish on the coast extending from Cape Bonavista on the east to Point Riche on the west. By the treaty of Versailles (1783) the boundaries were so changed as to extend from Cape John on the east to Cape Ray on the west, and at the same time the French were promised 'freedom from interruption by the competition of the British.' This promise the French construe and urge so as to prevent the development of the resources of the interior adjacent to coasts over which their rights extend, and much friction consequently exists between the French and the people of Newfoundland. A governor was appointed in 1728. The present form of government, established in 1855, consists of the governor, an executive council, or cabinet of seven members, a legislative council of fifteen members (appointed by the crown), and a general assembly of thirty-six members (elected by the people). Every man of twenty-one years of age, a British subject and two years a resident in the colony, is entitled to vote at elections.

See L. A. Auspach, *The History of the Island of Newfoundland* (1827); Little, *The Government of Newfoundland* (1855); W. Fraser Rae, *Newfoundland to Manitoba* (1881); Murray and Howley, *Geological Survey of Newfoundland* (1881); Hatton and M. Harvey, *Newfoundland, the Oldest British Colony* (1883); Howley, *Ecclesiastical History of Newfoundland* (1888), and *French Treaty Rights in Newfoundland: the Case for the Colony* (1890). For the map, see CANADA.

Newfoundland, a breed of dogs originally introduced into England from the island of Newfoundland, where they were used for draught purposes. As the mastiff at that time was scarce, and the St Bernard had not yet appeared in England, the Newfoundland became exceedingly common, but has been eclipsed in popularity of late years by the other two breeds mentioned. In general appearance the Newfoundland is a large and imposing dog, mild in expression, but showing great strength. The head should be large, with ears falling close; neck long, if possible; loins strong and well ribbed up, a point seldom seen in this breed; tail long and powerful, as it is used greatly when swimming; coat, long and wiry; colour, black without any white markings. Much discussion was caused by Sir E. Landseer's well-known picture of a black and white dog entitled 'A Distinguished Member of the Humane Society' (1838). An attempt was made to prove that the black and white dog was the true Newfoundland; but it is now generally regarded as a cross from the black. The black and white variety, now known as the Landseer Newfoundland, has been kept pure for many generations; it is now almost as pure, and certainly as handsome, as the original variety. The Newfoundland is a splendid water-dog, and takes to the sea at an early age. He is also a natural



Newfoundland Dog—*Bismarck*, 1890.

retriever, and, though himself too heavy for field work, has been extensively used to found the ordinary retriever. From his formidable appearance, combined with docility and intelligence, he makes a capital watch-dog, for which purpose he is extensively used.

Newgate, a celebrated London prison, stands at the western extremity of Newgate Street, opposite the Old Bailey. The exterior presents high dark stone walls, without windows. It was long the chief criminal prison of city and county, but is no longer used for prisoners to be tried at the Central Court, and is in the hands of the Court of Aldermen. The earliest prison here was in the portal of the *new gate* of the city as early as 1218; and hence the name. About two centuries afterwards it was rebuilt by the executors of Sir Richard Whittington, whose statue with a cat stood in a niche, till its destruction by the great fire of London in 1666. The present edifice was erected in 1780, but the new buildings were greatly damaged by fire in the Gordon Riots of that year (see Boswell's *Johnson* under that date), when 300 prisoners, felons as well as debtors, were released and let loose upon the public. This awful scene is described by Dickens in *Barnaby Rudge*. After the passing of the Prisons Bill in 1877 Newgate, being considered a very costly and redundant establishment, was gradually disused, and is now, except during sessions or when the gallows is in requisition, practically closed. The *Newgate Calendar* contains biographical notices of the most notorious murderers, burglars, thieves, and forgers who have been confined within its walls. See Griffiths, *Chronicles of Newgate* (1884).

New Granada. See COLOMBIA.

New Guinea, an island of Australasia, the largest in the world except the Australian continent, from which it is separated by the shallow island-studded Torres Strait, 80 to 90 miles wide at its narrowest part, about the meridian of the York Peninsula. There is now no doubt that the two regions at one time, probably during the Miocene epoch, formed continuous land, and an upheaval of less than sixty fathoms would suffice again to unite them. The hundred-fathom line, as determined by Wallace, would also include the insular groups of Jobi, Biak, Suk, Mafor

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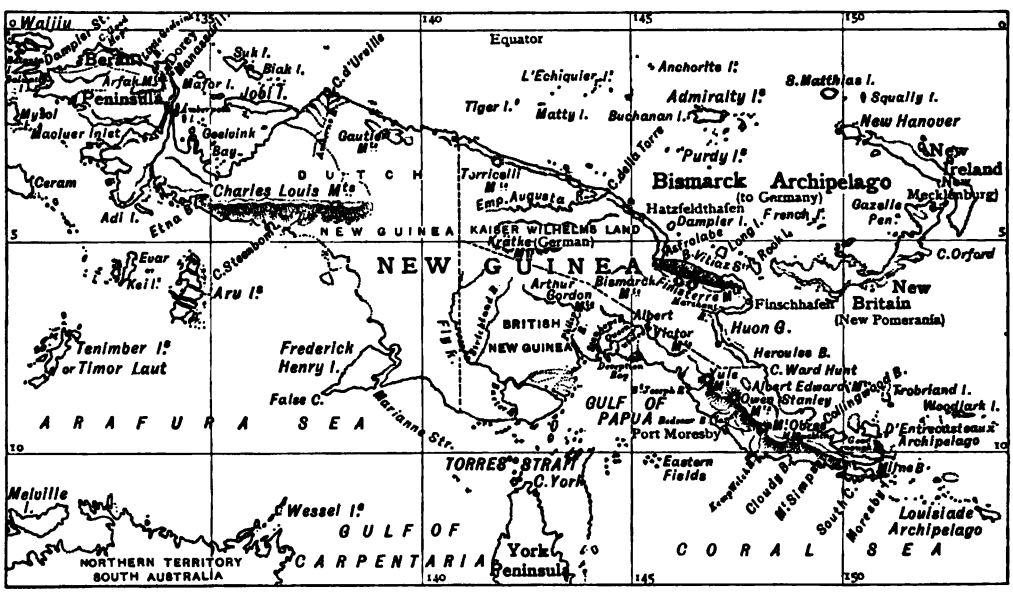
(Nufor), and Amberpoca in Geelvink Bay; Aru, near the south-west coast; Mysol, Salwatty, Batanta, and Waijiu at the north-western, and the Louisiade and D'Entrecasteaux Archipelagoes at the south-eastern extremity of New Guinea. But elsewhere the mainland is washed by deep waters, ranging from 500 to 1300 fathoms on the south-eastern and northern seaboards. It is disposed in the direction from north-west to south-east, stretching from Cape Goede Hoop ('Good Hope'), just south of the equator (0° 19′ S. and 132° 30′ E.), for about 1500 miles to South Cape, over 700 miles below the equator (10° 34′ S. and 150° 48′ E.). But owing to its extremely irregular shape, somewhat resembling a huge saurian, the width varies from under 20 miles at the narrowest parts of both extremities to 480 miles at the broadest part, about 141° E. long., giving a total area roughly estimated at 320,000 sq. m., or six times as large as England. The island thus forms three somewhat distinct geographical divisions—a large central mass from which two peninsulas project south-east and north-west. The south-east peninsula is defined by Huon and Papua Gulfs on the north and south coasts, while the north-west peninsula is decomposed into two secondary members by the Macluer Inlet, which penetrates from the south-west side to within 20 miles of Geelvink Bay on the north-west coast.

Most of the interior is still a *terra incognita;* but the more salient physical features of the island have already been roughly determined. It is essentially a mountainous and even an alpine region, being traversed in its entire length by lofty ranges, by far the highest in the Oceanic world, and in some places rising 2000 or 3000 feet above the snow-line. These ranges, which in the two peninsular regions form single continuous systems, develop in the broader central parts two or more parallel chains with a general south-easterly trend, at many points approaching close to the coast-line, and elsewhere enclosing extensive rugged plateaus. Thus, the Arfak Hills of the north-west peninsula (10,000 feet) are continued in the central region by the Charles-Louis range, which for nearly 300 miles appears to maintain an altitude of over 14,000 feet, with many peaks towering to heights of 18,000 and even 20,000 feet. Parallel with this chain runs the



northern coast range, known as the Finisterre Mountains (11,500 feet), which terminate eastwards in an imposing headland projecting in the direction of New Britain, and enclosing Huon Gulf on the north side. Between these two chains run the Bismarck and Krätke ranges (10,000 feet), the latter discovered in 1887 by Dr H. Zöller. About the same time Count Pfeil, administrator of German New Guinea, penetrated from the north coast still farther inland in search of expansive tablelands suitable for settlement; but he found the whole surface broken into a confused mass of steep mountains composed mostly of old sedimentary rocks—altogether 'a rugged, hopeless region' intersected by deep gorges, but few open river-valleys.

All these mountain-ranges converge in the south-east peninsula in a single lofty chain which traverses the whole of British New Guinea, but the various sections of which take the names of the Albert Victor, Yule, Owen Stanley, and Lorne ranges, in their order from west to east. But the nomenclature is still far from settled, and much confusion has been caused by recent travellers renaming peaks and crests and even rivers already determined by previous explorers. The prevailing formations appear to be very old plutonic and sedimentary rocks. Gneiss and granites crop out in the Arfak highlands; elsewhere stratified clay-slates and old limestones abound, containing shells identical with those of south-east Australia; quartz and greenstones occur on the south-east coast resembling those of the auriferous region in New South Wales, and there are numerous other indications of the presence of gold in many districts. Earthquakes are frequent in some places, but no active volcanoes appear to exist, although there are several comparatively recent craters on the spurs of the Owen Stanley range, while pumice and scoriæ cover the flanks of the Finisterre Mountains.

One result of the explorations has been the discovery of a surprising number of considerable rivers in every part of New Guinea. The three largest appear to be the Amberno (Mamberan, or 'Great River') in Dutch, the Empress Augusta in German, and the Fly in British territory. The Amberno (the Rochussen of Dutch geographers) descends from the Charles-Louis range to the east

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side of Geelvink Bay, where it develops an extensive delta. The Empress Augusta flows from the unexplored central water-parting north-eastwards to the coast at Cape della Torre in 4° S. and 144° 30′ E., entering the sea in a broad, deep channel without any delta. In the rainy season it is navigable for many miles by large vessels, and both the main stream and several tributaries are accessible for a long way to river-steamers. But the largest of all New Guinea rivers is certainly the Fly, which rises on the southern slope of the central water-parting and flows mainly south-east to a delta of vast extent on the west side of the Gulf of Papua. The Baxter (Mia Kasa), which enters the sea farther west, opposite Cape York, is an independent stream unconnected with the Fly. This great estuary, which was discovered in 1845 by Blackwood and named after his vessel the Fly, was ascended in 1876 by D'Albertis for 500 miles in a steam-launch, and again in 1889 for over 600 miles by Sir W. Macgregor. The tides ascend the Fly for 150 miles, and 90 miles higher up it is joined on its left bank by the Strickland. Farther east several other copious streams flowing from the main range through British territory to the Gulf of Papua have also been either recently discovered or for the first time surveyed. Such are the Douglas, Centenary, Stanhope, and Queen's Jubilee, all of which converge in an almost continuous common delta about the head of the gulf. But here again the terminology is much confused, the Douglas and Jubilee being respectively Blackwood's Aird and the already partly-surveyed Aivei. Mr Bevan's Philip also is merely the upper course of the Aird, of which the Centenary appears to be an eastern and the Newbery a western branch. The east side of Papua Gulf is joined by other navigable streams from the Owen Stanley range, the more important of which are the St Joseph, flowing from Mount Yule to Hall Sound; the Vanapa, draining the southern slopes to Redscar Bay, and followed by Sir W. Macgregor on his expedition to Mount Victoria (Owen Stanley) in 1889; the Kemp Welch, flowing to Hood Bay; and the Davadava and Hadava, reaching the coast at Milne Bay. In German territory also, besides the Empress Augusta, no less than nine new rivers have recently been discovered, one of which, the Markham, gives easy access a long way into the interior.

The whole of New Guinea lies within the track of the south-east trade-winds, which prevail from March to October, and which are charged with much moisture from the Pacific. These are followed for the rest of the year by the north-west monsoons, whose rain-bearing clouds are condensed on the cold alpine slopes of the island. The consequence is that the rain or snow fall is considerable in every part of the country, and this, combined with an average high temperature of from 85° to 90° F., results in a hot, moist climate on all the low-lying coast-lands and fluvial valleys. So excessive is the moisture in some places that 'boots put aside for a day or two grow a crop of mildew nearly half an inch in thickness' (Guillemard). Hence fever is endemic, not only in the lowlands, but to a considerable height above sea-level, the malarious exhalations being carried upwards by the atmospheric currents, as on the Central African plateaus. At the same time its action is most capricious, and its true character still but little understood. 'It may be very troublesome where weather, soil, and other conditions should be favourable to health, and perhaps almost absent under the opposite conditions' (Coutts Trotter). Exactly similar phenomena have been observed in tropical Africa, and it may be inferred that New Guinea, as a whole, is as unsuitable as that continent for European settlement. But some of the uplands beyond the fever zone may be found adapted, if not for permanent colonisation, at least for the establishment of health-resorts for officials, traders, and missionaries.

Thanks to its abundant rainfall, varying altitudes, high temperature, and position intermediate between the Asiatic and Australian botanical areas, New Guinea is almost everywhere clothed with a rich and highly diversified flora. The vegetable zones appear to be even superimposed as in Mexico, and Sir W. Macgregor's party, after passing successively through the domains of tropical plants, such as the cocoa-nut, sago, banana, mango, taro, and sugar-cane, and of such temperate or subtropical growths as the cedar, oak, fig, acacia, pine, and tree-fern, were gladdened on the higher slopes by the sight of the wild strawberry, forget-me-not, daisy, buttercup, and other familiar British plants. Towards the summits these were succeeded by a true Alpine flora, in which Himalayan, Bornean (Kinibalu), New Zealand, and subantarctic forms were all numerously represented. In general, arboreal vegetation ceases at about 11,000 feet, and shrubs at 12,000, the latter being overlapped by the Alpine zone. In New Guinea the Asiatic and Malayan floras are far more richly represented than the Australian, as shown by the absence or rarity of the eucalyptus, of which as many as fifty varieties are found in the southern continent. Indigenous forms are numerous, and include many species of palm.

On the other hand, the New Guinea fauna is much more closely related to that of the Austral than to that of the northern hemisphere. This is seen in the almost total absence of placental mammals and the presence of over thirty species of marsupials, such as the cuscus and kangaroo, as well as the bower-bird, of which two new species were discovered on the Owen Stanley range. Here also were found the European lark and blackbird in curious association with the bird of Paradise, of which typical New Guinea bird many varieties occur. Scarcely any birds of prey are found, a circumstance which may explain the presence of so many forms—parrots, cockatoos, pigeons, &c.—remarkable for their gorgeous plumage. Reptiles are numerous, and include a remarkable python (*Chondropython pulcher*), intermediate between the Asiatic python and American boa. A still more remarkable intermediate form, supplying a link between reptiles and mammals, is the spiny ant-eater, which is allied to the Australian echidna, and like it oviparous. There are three species of this ant-eater, while the placental mammals are represented only by some bats and mice, besides the pig and dingo, both probably introduced in comparatively recent times.

Man also would seem to have invaded the island after its separation from Australia, for the inhabitants of the two regions belong to fundamentally distinct stocks. Between the Australians and Papuans, who form the great bulk of the New Guinea population, there is little in common except the dark colour, considerably darker, however, in the latter than in the former. But the New Guinea natives are far from a homogeneous people, and the descriptions of travellers in different parts of the island differ so greatly that many anthropologists have doubted or even denied the existence of any Papuan type. These discrepancies are due to the presence and intermingling of at least four ethnical elements: *Papuan* proper, diffused over the whole region; *Negrito* (Karons and others in the north-west peninsula and probably also in the central highlands); *Eastern Polynesian*, such as the Motu of the south-east coast; lastly, *Malay*, along the north-western seaboard and around the shores of

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Geelvink Bay. The mingling of these elements in different proportions has brought about much diversity in the physical appearance, speech, usages, and general culture of the natives, who are everywhere broken into small tribal groups speaking a surprising number of distinct languages, some of which are members of the widespread Malayo-Polynesian family, while others, especially in the interior, seem to have no connection with that or any other known forms of speech. The tribal organisation is extremely loose, hereditary rulers being nowhere recognised, and the so-called chiefs depending for their prestige either on personal, social, or religious influences (S. Forbes). Cannibalism is very prevalent, though by no means universal; and some tribes, such as the Togaris of the south coast, are predatory, living entirely by plundering expeditions amongst the surrounding populations. But many others are peaceful, industrious, and keen traders, displaying remarkable skill, especially in the arts of pottery, wood-carving, and husbandry.

New Guinea appears to have been first sighted by A. D'Abreu in 1511, and first visited by De Meneses about 1526, and Alvaro de Saaverda in 1528. It received its present name in 1546 from Ortiz de Retez (Roda), who was struck by the resemblance of its inhabitants to those of the Guinea coast in West Africa. During the flourishing period of the empire of Tidor, the Malay sultans of that state extended their sway over the so-called *Raja Ampat* or 'Four Kingships' of Waijiu, Salwatty, Mysol, and Waigamma, including large tracts on the adjacent mainland. In 1793 the East India Company occupied the island of Manassari in Geelvink Bay; but the British troops were soon withdrawn, and in 1814 the English government admitted the claims of Holland to the Raja Ampat as suzerain of the sultan of Tidor. In 1848 the Dutch proclaimed their sovereignty over the western half of the island as far as 141° E. long., and this meridian was accordingly taken as the western boundary of the eastern half in 1884, when that section was divided between Great Britain and Germany. The boundary between the northern or German and the southern or British division coincides with the crest of the main water-parting. Subjoined is a roughly estimated table of the areas and populations of the territories assigned to these three states:

	Area in sq. miles.	Population.
Dutch New Guinea	158,000	200,000
British "	90,000	185,000
German "	70,000	100,000
Total	318,000	485,000

In the Dutch section, which is attached to the Residency of Ternate, there are no towns or administrative centres, Dorey, at the north-west side of Geelvink Bay, being merely a missionary station chiefly noted as the starting-point of many expeditions to the interior. No effort has ever been made by the Dutch government or by private enterprise to develop the resources of the country. German New Guinea, officially known as Kaiser Wilhelm's Land, is a protectorate administered by the German New Guinea Company, which has stations at Astrolabe Bay, Finschhafen, Konstantinhafen, and Hatzfeldhafen. It yields for export tobacco, areca, sago, bamboo, ebony, and other woods. British New Guinea, which includes the D'Entrecasteaux and Louisiade Archipelagoes, was administered as a protectorate by a Commissioner till 1888, when the sovereignty of the Queen was proclaimed, the government being placed under Sir William Macgregor as administrator. New South Wales, Victoria, and Queensland each contribute £5000 towards the expenses of administration. The territory is divided into a western, central, and eastern division, under deputy-commissioners, the chief station being Port Moresby. The revenue already exceeds the expenditure, and the exports, chiefly gold, pearl-shells, bêche-de-mer, and copra, exceeded £24,000 in 1889.

See works on New Guinea and accounts of voyages thither by Th. Forrest (1774–76), Modera (Dutch, 1830) in the *Journ. Roy. Geog. Soc.* xxviii., Dumont d'Urville (1839), Maraden in *Trans. Roy. Asiat. Soc.* 1831, G. W. Earl (1835) in *Logan's Journal*, vi. (1852), J. MacGillivray (1850), O. Finsch (German, 1865), Miklukho Maclay (in *Petermann*, 1873), Rev. Wyatt Gill (1874), Moresby (1876 and 1877), Octavus Stone (1880), Lawer (1880 and 1883), D'Albertis (1880), Powell in *Proc. Roy. Geog. Soc.* 1883, Coutts Trotter in the same, 1883, 1884, and 1890, Prince Roland Bonaparte in the *Bulletin* of the French Geog. Soc. 1884, Rye (bibliography of over 1000 entries) in supplementary papers of the Roy. Geog. Soc. 1884, Rev. J. Chalmers (1885 and 1887), Ch. Lyne (1886), Romilly (1886 and 1889), H. O. Forbes in *Scot. Geog. Mag.* 1888, Rev. S. M'Farlane (1888), Sir W. Macgregor in *Proc. Roy. Geog. Soc.* 1890, Bevan (1890); besides A. R. Wallace's *Malay Archipelago* (1869), and A. H. Keane's *Eastern Geography* (1887).

New Hampshire, the 'Granite State,' the most northerly of the thirteen original United States of North America, lies between 42° 40′ and 45° 18′ N. lat., and is bounded N. by the province of Quebec, E. by Maine and (for 18 miles) the Atlantic Ocean, S. by Massachusetts, and W. by the *right* bank of the Connecticut River. Area, 9305 sq. m.—a fourth larger than Wales. The average elevation of the state is about 1200 feet, the general slope being towards the south. The highest point is Mount Washington (6293 feet), in the White Mountains, which include more than a hundred peaks of note, mainly in the northernmost county; among the peaks over 5000 feet high are those bearing the names of the successive presidents, Adams, Jefferson, Madison, and Monroe. Geologically they consist of early metamorphic rocks; immense masses of granite and gneiss constitute the bare peaks that make the name of the range as appropriate in summer as in winter. The largest lake is Winnipiseogee (72 sq. m.); the principal rivers are the Connecticut, Merrimac, and Piscataqua. From Dover Point to its mouth the Piscataqua is about half a mile wide; and the volume and swiftness of its current at ebb-tide prevent the freezing of the water in Portsmouth harbour during the coldest winters. The Merrimac is said to turn more spindles and propel more shuttles than any other river in the world. The state is noted for its salubrious climate and grandly picturesque natural scenery. The mean annual temperature at Concord is 46° F.

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The principal agricultural products are hay, potatoes, maize, and oats. There are still over a million acres of forest in the state, which have an average value per acre of about double that of the cleared land. Agricultural interests had steadily declined for a number of years, but of late New Hampshire has become very popular as a summer-resort, and the farmers, who owing to the rough and sterile soil could not compete in the great markets with those of the West, now find a new and important market brought to their very doors. But the manufacturing is the leading industry in New Hampshire, the chief centres being Manchester (the largest city), Nashua, and Dover. The total value of property in the state is about $350,000,000.

New Hampshire embraces ten counties, and returns two members to congress. The governor is elected biennially, and by him the judiciary are appointed until seventy years of age. The public

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schools are efficient, and the state possesses one college—Dartmouth, founded at Hanover in 1769 as a school for the instruction of Indians; it has well-appointed academic, scientific, medical, and agricultural departments, with libraries aggregating 67,000 volumes. There is also a state normal school at Plymouth.

History.—The earliest settlements were made in 1623 near Dover and Portsmouth. In 1641-79, 1689-92, and 1699-1741 New Hampshire was joined to the Massachusetts colony, but during the intervening dates and until 1775 it was under royal governors of its own. The people took an active part in the revolution. A provisional government was formed in 1776, a state constitution adopted in 1784; and New Hampshire was the ninth state (June 21, 1788) to ratify the national constitution. Among the eminent men born here have been—besides one president, Franklin Pierce—Daniel Webster, Lewis Cass, Salmon P. Chase, and Horace Greeley. Pop. (1790) 141,899; (1840) 284,574; (1880) 346,991; (1890) 376,530.

New Hanover, one of the Bismarck Archipelago, lying off the north-east coast of New Guinea, with an area of 570 sq. m. Its physical characteristics resemble those of New Britain (q.v.).

New Harmony, a village (pop. 1095) of Indiana, 28 miles by rail NW. of Evansville, was first settled in 1815 by a German community of religious socialists, called Harmonists, under the leadership of George Rapp (q.v.). In 1824 the village and domain was purchased by Robert Owen, for an experimental community on his system; but this failed after a test of nearly three years.

Newhaven, a seaport of Sussex, at the mouth of the Ouse, 8½ miles E. of Brighton and 56 S. of London. It has risen into importance through its steamboat traffic, particularly to Dieppe (5½ hours), and has a large fort (1864–69) and a little Norman 12th-century church, with an east tower and small semicircular apse, curiously like that of Yainville-sur-Seine. Pop. (1851) 1358; (1891) 4955.

Newhaven, a fishing-village of Midlothian, on the south shore of the Firth of Forth, 1 mile WNW. of Leith, and 2 miles N. of Edinburgh. Dating from about 1490, it has a tidal harbour, reconstructed in 1876–77 at a cost of £10,000, and is famous for its fish dinners and fishwives. Pop. of parish (1841) 2103; (1881) 4694. See Charles Reade's *Christie Johnstone* (1853), and Mrs Cupples' *Newhaven, its Origin and History* (1888).

New Haven, the chief city and seaport of Connecticut, and capital of New Haven county, at the head of New Haven Bay, 4 miles from Long Island Sound, and 73 miles by rail ENE. of New York. Its broad streets are shaded with elms, and the public squares, parks, and gardens, with its handsome public and private edifices, make it one of the most beautiful of American cities. It is the seat of Yale College (q.v.), and contains also the Sheffield scientific school, the Hopkins grammar-school (1660), and thirty-four public schools. Its other public buildings include the former state-house, the city hall, United States government building, and about sixty churches. The harbour has a jetty and a breakwater surmounted by a lighthouse, and the port has a large coasting trade. But New Haven is of more consequence as a manufacturing town, employing many thousands of hands in its large works, and producing hardware, wire, locks, clocks, cutlery, firearms, corsets, india-rubber goods, carriages, furniture, paper, matches, musical instruments, &c. New Haven was settled in 1638 by a company from London, and the colony was not united to that of Connecticut until 1662; and till 1873 it was recognised as, jointly with Hartford, the capital of the state. It was incorporated as a town about 1665, and chartered as a city in 1784; and it retains a town as well as a city administration, choosing selectmen, &c., besides a mayor, aldermen, and council. Pop. (1850) 22,529; (1880) 62,882; (1890) 85,981.

New Hebrides, a chain of islands in the Western Pacific, extending NNW. to SSE., and lying W. of Fiji and NE. of New Caledonia. There are in all some thirty islands (area, 5110 sq. m.), of which twenty are inhabited, the people, mostly of the Melanesian race, numbering about 70,000. They are of volcanic origin, some—e.g. Ambrym, Tanna, and Polevi—having active volcanoes, but rest upon a coral foundation. The larger islands are Espiritu Santo (70 miles long by 40 wide), Mallicolo (56 miles by 20), Ambrym (22 miles by 17), Vaté or Sandwich (30 miles by 15), Erromango (30 miles by 22), Tanna (18 miles by 10), and Aneityum (35 miles in circumference). All are wooded, and some lofty, reaching 3000 feet. The climate is moist, but clear and healthy, the thermometer ranging from 60° to 90° F. The usual tropical plants and products are grown—yam, taro, banana, bread-fruit, sugar-cane, arrowroot, and cocoa-nut. Sandalwood, at one time common, is now almost extinct. The seas swarm with fish, some of them poisonous, and whales are taken near by. The people are savage cannibals of a low type, and are decreasing in number. They speak a great number of dialects, many being unintelligible to the others. The southern islanders (Erromango to Aneityum) have been civilised by English and Scottish missionaries. This chain was discovered by the Portuguese navigator Quiros in 1606, and was thoroughly explored by Captain Cook in 1773. They are claimed by the British, though nothing is done to occupy them. The French have more than once cast covetous eyes upon the group, but their attempts to annex it have encountered the strenuous opposition of the Australian colonists. Since 1863 the natives of these islands have been every year carried away to serve as labourers on the plantations in Queensland, Fiji, and New Caledonia, and many barbarities have been perpetrated in connection with the traffic. See Dr J. Inglis, *In the New Hebrides* (1887) and the Memoir of J. G. Paton (1889).

New Holland. See AUSTRALIA.

New Ireland, now called NEU-MECKLENBURG, a long narrow island in the Pacific Ocean, lying to the north-east of New Guinea. Area, 4900 sq. m.; length, 300 miles; width, 15 miles. The hills rise to 6500 feet, and they and the whole of the interior are richly wooded. The climate, products, and inhabitants resemble those of New Britain (q.v.).

New Jersey, one of the thirteen original states of the American Union, is bounded on the N. by the state of New York; E. by the Hudson River, Staten Island Sound, Raritan Bay, and the Atlantic; SW. by Delaware Bay; and W. by the Delaware River, which separates it from Pennsylvania. Its greatest length is 167 miles; its width varies from 32 to 59 miles. It has an area of 7577 sq. m.; it is the smallest of all the states save three, but it ranks eighteenth in population.

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In the north-west part of the state there are two portions of the Appalachian system. The Blue or Kittatinny Mountains extend along the Delaware from the Water Gap up, attaining a height of 1400 to 1800 feet. The highlands south and east of these consist of many ridges, their greatest height 1488 feet. In this part of the state are many small lakes. The Palisades, the Orange Mountains,

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and other hills are in the red sandstone region, which extends from the north-east to the central part of New Jersey. The Navesink highlands, south of Sandy Hook, reach a height of 282 feet, support two lighthouses, and are the only considerable elevation on the Atlantic coast south of New England. The central portion of the state is generally level and fertile; the southern part is in large measure sandy, covered with pine-woods, and marshy near the coast. The state is abundantly watered; its chief rivers, the Passaic, Raritan, Little and Great Egg Harbor, flow south-east into bays. The coast from Sandy Hook to Cape May is generally protected by peninsula or island beaches; the only considerable exception to this rule being the strip of mainland, about 18 miles long, between Monmouth and Squan beaches.

In agriculture the state occupies a prominent position in proportion to its area. The farms comprise some 3,000,000 acres, more than three-fourths under tillage; the value of farm lands approaches $200,000,000, and that of farm products is about $30,000,000 annually. The chief products are maize, oats, wheat, rye, hay, potatoes and sweet potatoes, cattle, butter, and milk. The leading mineral products are iron ore, limestone of various kinds, zinc, and slate. Glass, pottery, machinery, leather, silk, and sugar are among the chief manufactures.

New Jersey returns seven members to congress. The state legislature meets at the capital, Trenton, in January; a senator is chosen from each of the twenty-one counties (one-third each year) for three years; the assembly has about sixty members, who serve one year. The annual taxes are about $3,000,000, of which full half is devoted to education. There are (besides seven county asylums) two large lunatic asylums near Trenton and Morristown, the latter accounted a model; an institution for the deaf and dumb, an industrial school for girls, and a large state-prison, at or near Trenton; a reform school for boys near Jamesburg; and a home for disabled soldiers at Newark. There are 1400 school districts. In the cities over 100,000 pupils are enrolled, and some 240,000 in the rural districts. The state normal school is at Trenton, and its preparatory school at Beverley; and the state agricultural and scientific school is connected with Rutger's College, at New Brunswick. The College of New Jersey, founded in 1746 at Princeton (q.v.), is the most famous institution in the state.

New Jersey has two canals, the Morris and the Raritan, and some fifty railroads, with nearly 3000 miles of length. The position of the state, between the two great eastern cities and bordering upon both, has powerfully stimulated travel, industry, and population. Its south-west portion has Philadelphia for a market; its north-east section, including its two largest towns, is a suburb of New York. Its coast from Navesink to Squan is covered with villas, cottages, and hotels. Cape May and Long Branch for half a century, and Atlantic City for twenty years or more, have been noted seaside resorts. Asbury Park, Ocean Grove, Seabright, &c. are now growing places, crowded in summer. Newark and Jersey City are by far the largest cities; next come Paterson, Camden, Hoboken, Trenton, Elizabeth, New Brunswick, and Orange. Pop. (1800) 211,149; (1840) 373,306; (1880) 1,131,116; (1890) 1,444,933.

History.—In 1617 the Dutch settled at Bergen, near New York. In 1623 Cornelius May ascended the Delaware and built a fort four miles below the site of Camden. Some English colonists in that region were driven away in 1638 by the Swedes, who were conquered in 1655 by Peter Stuyvesant. In 1664 the territory was granted by Charles II. to the Duke of York, and by him to Lord John Berkeley and Sir George Carteret, with full power of government to them and their assignees. There was no trouble with the Indians, whose titles were peacefully purchased. The proprietors soon divided the territory into East and West Jersey. In 1674 Berkeley sold West Jersey to two Quakers, who settled Salem and Burlington; and in 1682 a society under Penn bought the Carteret rights in East Jersey. In 1702 the proprietors surrendered their power of government to the crown, and the two provinces were reunited; and from 1738 New Jersey had its own royal governors, always at issue with the assembly and the people. New Jersey bore its part in the colonial wars, contributed 10,726 men to the Continental army, besides militia, and spent over $5,000,000 in the cause of liberty. It suffered heavily during the revolution, and was the scene of several important campaigns and battles. The state sent nearly 7000 men to the war of 1812, and for the civil war thirty-seven regiments of infantry, three of cavalry, and five batteries. See the *History of New Jersey*, by Raum (1880).

New Jersey Tea, a common name of Red Root (q.v.).

New Jerusalem Church. See SWEDENBORG.

New Lanark. See LANARK.

New London, a port of entry of Connecticut, is on the right bank of the river Thames, 3 miles from Long Island Sound, 51 by rail E. of New Haven, and 126 NNE. of New York, with which it has a daily steamboat communication. It has a court-house, a brown-stone city hall, and a granite custom-house. The manufactures include woollens, sewing-silk, agricultural machinery, hardware, and crackers (*Anglicé*, biscuits); fruit-canning also is carried on. The harbour (30 feet deep) is one of the best in the United States, and many vessels engaged in the coasting trade, and in sealing or fishing, are owned here. On the left bank of the river is a United States navy yard; and there are two forts here, though no longer effective. New London was settled in 1645, and in 1781 was burned by Benedict Arnold. Pop. (1850) 8991; (1890) 13,759.

Newman, JOHN HENRY, CARDINAL (1801–90), the leader of the Oxford Tractarian movement of 1833 in the Church of England, who joined the Roman Catholic Church in 1845, and was made a cardinal by Leo XIII. in 1879. He was born in London on the 21st February 1801. His father was John Newman, a member of the banking firm of Ramsbottom, Newman, & Co. His mother was the child of an old Huguenot family which had settled in London as paper-manufacturers. She was a moderate Calvinist, and taught her children to love the school of Scott, Romaine, Newton, and Milner. Her children learned early to take great delight in the Bible, and Newman has always ascribed the utmost influence over his early religious views to his mother's teaching. From Scott, the commentator on the Bible, he learned two principles which may be traced in all his subsequent career. The first was to prize 'holiness before peace;' the second was that 'growth' is 'the only evidence of life.' From his reading of Law's *Serious Call* he dates his firm inward assent to the doctrine of eternal punishment, which he always held as taught by our Lord himself; a doctrine, however, of which he often endeavoured to attenuate the mystery—notably in *Callista* (chap. xix.). Milner's *Church History* first attracted Newman to the writings of the early Fathers. Yet at the same time he derived from Newton's book on the prophecies a belief which more or less biased his mind long

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after he had ceased to accept it as a truth—that Rome is Antichrist. In the autumn of 1816 a belief took possession of him, as he tells us in his *Apologia*, that he was to lead a life of celibacy; and this belief held its ground, with certain brief intervals of 'a month now and a month then,' up to the age of twenty-eight, after which it remained absolutely fixed. Newman went to a private school at Ealing. The stoppage of his father's bank compelled him to take his degree at Oxford as early as possible without taking full time to read for honours, and he actually took it (from Trinity College) in 1820, when he was only nineteen, but overwork resulted in a partial failure. In 1821 he wrote jointly with a friend two cantos of a poem on St Bartholomew's Eve, but the fragment has never been republished. It should be added that Newman was always passionately fond of music, and showed delicacy and skill as a violinist.

In 1822 Newman was elected to a fellowship in Oriel College, then the most distinguished in the university; and it was here that, after a period of some loneliness, he formed his close intimacy with Dr Pusey, and subsequently with Hurrell Froude, whose dash and genius exerted a great influence over Newman, and who had a great share in starting the Tractarian movement of 1833. In 1823, too, Newman first read Butler's *Analogy*, from which he tells us that he learned to interpret the less certain aspects of natural religion in the sense of revealed religion, and especially to interpret natural phenomena in the sense of the sacramental system—i.e. as conveying mystical spiritual influences of which there is no external sign. Keble's *Christian Year* (1827) fell in exactly with this impression of the mystery at the heart of apparently purely physical influences. From Bishop Butler Newman also derived the principle that 'probability is the guide of life,' which, however, he more or less modified when he became a Roman Catholic, holding thenceforward that in all matters of first-rate religious importance certitude can be attained and not merely probability. At Oriel Newman formed cordial relations with Dr Hawkins, afterwards the provost of the college, and Whately, afterwards Archbishop of Dublin. Both of them exercised great influence over him by teaching him to define his thoughts clearly; and he afterwards expressed surprise that the casuistry of the Roman Church should have been credited with those habits of subtle discrimination which he had really gained from his Oxford colleagues.

Newman's first book, completed in 1832, but not published till 1833, was that on *The Arians of the Fourth Century*. It was a very careful and scholarly production, intended to show that the Arian heresy was not, as had been supposed, of Alexandrian origin, but was one of the Judaising heresies which sprang up in Antioch. The book is a powerful vindication of the Athanasian doctrine of the divine nature of Jesus Christ from the imputation of being arbitrary, or in any way an unauthorised ecclesiastical addition to the essence of the Pauline and Johannine theology. Newman insists on the dogmatic definition of the Son as being 'of one substance' with the Father, and not merely 'of like substance,' as the only escape from either creature-worship on the one hand or the impossible assertion of the voluntary self-sacrifice of an eternal creator on man's account on the other.

In the late autumn of 1832 Newman accompanied Hurrell Froude and his father in a Mediterranean tour undertaken in the hope of restoring the health of the former. It was on this tour that the fire gradually kindled which was to bear fruit in the Anglican movement of 1833. Most of Newman's smaller poems were written on this voyage, and were soon afterwards published with the signature δ in the *Lyra Apostolica*, a volume of verse the object of which was to reassert for the Church of England her spiritual authority and mission with something of the ease and buoyancy of poetic license. It was on this tour that Newman first saw Monsignore (afterwards Cardinal) Wiseman in Rome, and told him gravely in reply to the expression of a courteous wish that Hurrell Froude and he might revisit Rome, 'We have a work to do in England.' At Rome Newman left his friends to go alone to Sicily, where he fell ill of malarial fever. His mind was deeply possessed during this illness by the idea of the work he had to do in England, and the delay in finding passage to England was very trying to him. He spent much of his time in the Roman Catholic churches, which he had up to this period refrained from visiting, and speaks with great feeling in one of his poems of the good offices of that church, though a 'foe,' in ministering to his sickness, like the good Samaritan to the wounded Jew. At last he got passage on an orange boat to Marseilles. Becalmed in the Straits of Bonifacio, he wrote the best known of all his poems, 'Lead, kindly Light.' From Marseilles he travelled straight to England, reaching home in time to be present at Keble's Oxford assize sermon on National Apostasy, which he always regarded as the date at which the Tractarian movement began. It was preached on July 14, 1833.

Into the series of *Tracts for the Times* which now commenced Newman threw himself with great energy; indeed he himself composed a considerable number of them. In the very first page of the first tract, which was his own, he told the bishops that 'black event though it would be for the country, yet we could not wish them a more blessed termination of their career than the spoiling of their goods and martyrdom.' The tracts which now began to pour forth were all intended to assert the authority of the Anglican Church, to claim apostolical descent for the Anglican episcopate, to advocate the restoration of a stricter discipline and the maintenance of a stricter orthodoxy, to insist on the primary importance of the sacraments, and the duty of loyalty to the church—Newman persuaded a friend to stay away from the marriage of a sister who had seceded from the Anglican Church—and in general to preserve the dogmatic purity of the church as well as to guard her divine ritual. But while he was full of confidence in these principles, which he held in common with Rome, what puzzled him was to justify adequately the strong anti-Romanist language of the greater Anglican divines; and a great part of his time was given during the Tractarian movement to laying down clearly the doctrine of the *via media* or midway course between popular Protestantism and Roman Catholicism, which he claimed that the Anglican divines of the 17th century had taken up. Up to nearly the end of his Anglican period he disapproved strongly the cultus of the Virgin Mary and the saints as interfering with the true worship of God. In 1837 he made an attempt to distinguish the Anglican *via media* from the doctrine of the Church of Rome in a course of lectures on 'The Prophetical Office of the Church viewed relatively to Romanism and Popular Protestantism.' In these lectures he contrasted the attitude of the Anglican and Roman churches in reference to the use and abuse of private judgment, their attitude towards the principle of infallibility, their very different use of Scripture, and their view of the fortunes of the church. But while defending and defining as far as possible the *via media* of Anglicanism,

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Newman frankly admitted that it had never been practically enforced, and that it was a theoretic line on which no actual ecclesiastical policy had been founded. This it was which it remained for the Tractarians to do.

In 1838 Newman followed up his discussion of the *via media* so far as it affects authority with a volume on the *via media* in its relation to the doctrine of justification by faith. Again he taught that the Anglican Church takes a middle course between the Roman Catholic Church and popular Protestantism in maintaining that justification by faith—or the *imputation* without the *reality* of righteousness—must precede sanctification, which gives the reality, though sanctification must necessarily follow; while the Roman Catholic theology regarded sanctification as the whole substance of justification.

In Tract 85, which was also published in 1838, Newman made an effort to apply the theology of the *via media* to the interpretation of Scripture. He held that the Roman Catholic Church takes a view too independent of Scripture, while the Anglican Church is right in asserting that all revealed doctrine is to be found in Scripture, though it could not be found on the mere *surface* of Scripture, since it needs the guidance of the church's traditions to help us to find it there. He admitted most fully that the stress which one might expect to be laid is not laid in Scripture on baptism, on confession, on absolution, nor even on public worship itself, and that we can only find these doctrines in Scripture by attaching the importance which tradition teaches us to attach to the hints and *obiter dicta* of Scripture. Scripture, he held, *verifies* the teaching of the church rather than systematically inculcates it. Tract 85 was one of the most careful and characteristic of all Newman's essays as a Tractarian.

Tract 90, which appeared early in 1841, and which gave rise to so much agitation in Oxford, was the most famous, but certainly one of the least interesting of the tracts. The right wing of the Tractarian party, headed by William George Ward (q.v.), was at this time urging Newman to reconcile his High Church doctrines with the Thirty-nine Articles. This Newman thought a comparatively easy matter. The Articles recognise the teaching of the Books of Homilies as 'godly and wholesome;' and Newman contended that there was therefore ample evidence that the intention of the Articles was Catholic in spirit, and that they were aimed at the supremacy of the pope and the popular abuses of the Catholic Church in practice, and not at Catholic doctrine. The Homilies regard the first seven hundred years of the Catholic Church as quite pure, recognise six councils as received by all Christians, and speak of many of the Fathers as inspired by the Holy Ghost. Clearly therefore, in Newman's opinion, they were meant to gain over the moderate Romanists; and clearly they were not directed against the Council of Trent, for when the Articles were promulgated the council was not over. But in spite of this really substantial defence for the Anglican view of the Articles, Tract 90 provoked an explosion which was the end of the Tractarian movement, and brought on the conversion to Rome of those of the Tractarians who were most logical as well as most in earnest. The tract was repudiated by those in authority; the bishops almost all declared against the movement; Newman struggled for two years longer to think his position tenable, but in 1843 resigned the vicarage of St Mary's, which he had held since 1828, and retired to Littlemore (q.v.). The magnificent university sermon on 'Development in Christian Doctrine,' which was the preliminary stage of his *Essay on Development*, was the last which he preached in the university pulpit—viz. on the 2d February 1843. During his life at Littlemore he was a man suspected of all sorts of disloyalty to his church—for example, of being a Roman Catholic already, who only concealed his change of faith in order to exert more influence over other Anglicans—a course of which he was quite incapable. On the 8th October 1845 he invited the Passionist Father Dominic to his house at Littlemore in order that he might be received into the Roman Catholic Church, and on the following day he was received; and within a few months he had left Oxford, which he never saw again for thirty years.

Of Newman's life as a Roman Catholic it is necessary to speak only briefly. It was, however, in a literary point of view much more free and natural than his somewhat repressed and severely reined-in life as an Anglican. He first went to Oscott to be confirmed; then he went to Rome for a year and a half; and on his return in 1848 he published *Loss and Gain*, the story of an Oxford conversion very different from his own, but full of happy and delicate sketches of Oxford life and manners. Shortly afterwards he began, but did not at that time conclude, *Callista*, the story of a martyr in Africa of the 3d century. The little book is full of literary genius as well as of religious devotion, and it contains a most vivid picture of the devastation worked by the locusts in that country, as well as a still more impressive picture of Newman's conception of the phenomenon of demoniacal possession. In 1849 Newman established a branch of the brotherhood of St Philip Neri (q.v.) in England (see ORATORY). Newman established himself at Edgbaston, a suburb of Birmingham; and here he did a great deal of hard work, devoting himself to the sufferers from cholera in 1849 with the utmost zeal. The lectures on *Anglican Difficulties*, intended to show that Tractarian principles could only issue in submission to Rome on the part of any Tractarian who had a logical perception of what the movement meant, was the first book which drew public attention to Newman's great power of irony and the singular delicacy of his literary style. These lectures were delivered and published in 1850, and were followed in 1851 by the Lectures on 'Catholicism in England,' in which the Protestant prejudices and prepossessions about Roman Catholics were painted with a great power of ridicule and even caricature. This was the book which gave occasion to Dr Achilli's action for libel against Newman, tried by Lord Campbell, in which the verdict went against Dr Newman so far as this, that the jury thought that he had not succeeded in justifying the libel, and awarded damages of £100 against him, while the costs of the case are said to have amounted to £10,000. Lord Campbell's charge was deemed very one-sided even by Protestants.

Newman will probably be longer remembered as a great preacher than in any other capacity. His long series of Oxford sermons contain some of the finest ever preached from an Anglican pulpit, and his Roman Catholic volumes—*Sermons addressed to Mixed Congregations* (1849) and *Sermons on Various Occasions* (1857)—though less remarkable for their pathos, are even fuller of fine rhetoric, and show the rarest finish. In 1864 a casual remark by Canon Kingsley in *Macmillan's Magazine* on the indifference of the Roman Church to the virtue of truthfulness, an indifference which he asserted that Dr Newman approved, led to a correspondence which resulted in the publication of the remarkable *Apologia pro Vitâ Suâ*, afterwards slightly recast as *A History of My Religious Opinions*. In this book Dr Newman gave us much the most fresh and effective religious autobiography of the 19th century,

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and completely vindicated the simplicity and candour of his own theological career. It is perhaps the most fascinating of his many works, as it is of course the most personal. In 1865 Newman wrote a poem of singular beauty, giving his view of a good Roman Catholic's experience in death, called *The Dream of Gerontius*. It is a poem of marvellous subtlety and pathos, as unique in treatment as it is in subject, and is now republished in the volume of *Verses on Various Occasions* (1874), which contains also all the pieces originally published in the *Lyra Apostolica*. In 1870 he published his *Grammar of Assent*, a book on the philosophy of faith, based on the view that a believing and even credulous attitude of mind clears itself much more easily of false beliefs than a sceptical attitude of mind clears itself of false denials. In the controversies which led to the Vatican Council Newman sided with the Inopportunists. He believed that the decree of the pope's personal infallibility in putting forth *ex cathedrâ* definitions on theology or morals intended to teach the church would alienate many Anglicans from the Roman Church, and he thought the doctrine, though true, not ripe for definition, nor pressed upon the attention of the church by any heresy. He was at this time in vehement opposition to the Ultramontanes under Archbishop Manning and William George Ward, and the bitterness between the two parties ran very high. Nothing seemed less likely at that time than that Newman should ever become a Cardinal; but after the death of Pio Nono and the election of Leo XIII. the policy of the church altered, and the new pope was very anxious to show his sympathy with the moderates in various countries, and especially with the English Catholic moderates, of whom Dr Newman was much the most distinguished. Accordingly in 1879 Newman was summoned to Rome to receive the Cardinal's hat, which was conferred on him in a secret consistory on the 12th May in that year. In acknowledging the congratulations which flowed in upon him on that event he renewed his protest against liberalism in religion, by which he meant the depreciation of revealed dogma, and the popular view that one creed, honestly held and practised, is as good as another. For the last eleven years of his life Cardinal Newman seldom broke silence, and his chief contribution to the religious controversy of the day was an essay in attenuation of the difficulty of treating Scripture as plenarily inspired, its tendency being to suggest that inspiration does not necessarily include mere matters of detail in history, unless these are of the nature of what are called 'dogmatic facts'—i.e. facts which lie at the basis of revealed truths, such as the supernatural birth of Christ. Cardinal Newman died on the 11th August 1890, after a very short illness, of pneumonia.

See a work on Newman by the author of this article (1890); and Cardinal Newman's *Letters and Correspondence*, edited by Miss Mozley (1891).

Newman, FRANCIS WILLIAM, brother of the preceding, was born in London in 1805, and educated at a private school at Ealing. Thence he passed to Worcester College, Oxford, where he obtained first-class honours in classics and mathematics in 1826, and, in the same year, a fellowship in Balliol College. This fellowship, however, he resigned; and he withdrew from the university in 1830, at the approach of the time for taking the degree of M.A., declining the subscription to the Thirty-nine Articles, which was required from candidates for the degree. After a three years' stay in the East, he was appointed classical tutor in Bristol College, 1834. In 1840 he accepted a similar professorship in Manchester New College, and in 1846 his reputation led to his being appointed to the chair of Latin in University College, London, which he held till 1863; meanwhile he was an active contributor to numerous literary and scientific periodicals, and to various branches of ancient and modern literature. In controversies on religion he took a part directly opposite to that chosen by his elder brother, being no less eager for a religion in his view more world-wide, and including whatever is best in the historical religions. *Phases of Faith* is by far the most widely diffused of his works, simply because it was mainly negative; but it was preceded by a book called *The Soul* (1849), which aimed to show a solid ground for divine aspirations in the human heart. His smaller moral and religious essays are now collected in a single volume (ii.) of *Miscellanies*. Vol. i. of *Miscellanies* (1869) was followed by the above vol. ii. (1887), vol. iii., *Politica* (1889), and vol. iv., *Economica* (1890). Other works were a *History of the Hebrew Monarchy* (1847); a *Dictionary of Modern Arabic*, in Romanised type (2 vols. 1871); a *Handbook of Modern Arabic* (1866), giving the dialect now used by literary men in all Arab-speaking regions; and a *Libyan Vocabulary* (1882), in which, cutting out the Arabic, he tried to reproduce the old Numidian, Mauretanian, and Gætulian. He also published two mathematical volumes, one on Elliptic Integrals (1888–89); and a small book on the earlier life of his brother, Cardinal Newman (1891).

Newmarket, the 'racing capital of England,' lies on the border of Suffolk and Cambridgeshire, 14 miles ENE. of Cambridge and 69 NNE. of London. Twice almost destroyed by fire, in 1683 and 1700, it chiefly consists of one long street, and contains an unusual number of hotels and fine private houses, belonging to the great patrons of the turf. Principal edifices are the Jockey Club (1773); the adjoining Subscription Rooms (1844); the Proprietary Club (1882); the Rous Memorial Hospital (1883), with almshouses for eight jockeys and trainers or their widows; St Mary's Church, Perpendicular in style; and All Saints (1877). The town owes its prosperity to its horseraces, as old at least as 1605; and nearly half the male population are jockeys, trainers, or stablemen (Holcroft the dramatist was once one of their number). The race-ground, on Newmarket Heath, to the west, which is traversed by the Devil's Dyke (see CAMBRIDGESHIRE), is owned partly by the Jockey Club, partly by the Duke of Rutland, and, with its soft elastic turf, is one of the very finest in the world. Of its ten courses, the longest is 4½ miles in circuit. The training-ground bears a like character for excellence; and 400 horses are constantly in training. There are seven annual meetings, the principal events being the Two Thousand at Easter and the Cesarewitch in October. Pop. (1851) 3356; (1891) 6213. See HORSERACING; and J. P. Hore's *History of Newmarket and Annals of the Turf* (3 vols. 1886).

New Mexico, a territory in the south-western part of the United States, is bounded N. by Colorado, E. by Oklahoma and Texas, S. by Texas and Mexico, and W. by Arizona. The area is 122,580 sq. m.—larger than that of Great Britain and Ireland—and the pop. (1880) 119,565; (1890) 153,593. New Mexico is thus the fourth in area and the forty-third in population of the states and territories of the Union.

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The surface of New Mexico belongs to the great plateau upon which rests the Rocky Mountain system. From an altitude of 6000 to 6500 feet in the north it descends gradually to about 4000 feet along the Mexican border, and sinks to 3000 or 3500 in the Llano Estacado of the south-east. Except in the east the whole region is traversed

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by broken ranges of mountains having in general a north and south trend. In the northern central part the Santa Fé, Las Vegas, and Taos ranges form part of the main axis of the Rocky Mountains, with a number of peaks over 12,000 feet high. Farther south, and east of the Rio Grande, are numerous broken ranges; and west of the Rio Grande the Sierra Madre rise above the level of the *mesa* (plateau) in various ranges. These mountains and the intervening *mesas* are cut by deep cañons. In the north-west a number of chains cross the Arizona boundary, and the San Juan Mountains enter the territory from Colorado. Among the mountains, especially in the north-east, are many 'parks' noted for their beauty and fertile soils. The surface rocks belong mainly to the Cretaceous period, with belts of Triassic formation. The mountain-chains and great part of the Sierra Madre plateau are much older. There are many tracts of metamorphic rock and lava overflows, some of which appear to be of comparatively recent date.

The precious metals are found in almost all parts of the territory. Some of the most important mines are in the south-west near Silver City, Deming, and Lordsburg, others in the central region in the vicinity of Socorro, and farther north near Santa Fé. There are also valuable mines in the San Juan country. Some of these mines were rudely worked by the early Spaniards, who compelled the Pueblos to labour like slaves. In several places old shafts have been discovered which were filled by the Indians when they successfully revolted from this tyranny. Copper and iron occur in valuable deposits, and near Santa Fé are the famous turquoise mines. There are also fields of both bituminous and anthracite coal. Mineral and hot springs are numerous.

The great mountain-divide causes the drainage of New Mexico to flow south to the Gulf of Mexico, and west to the Pacific Ocean. The Rio Grande traverses the central part of the territory and receives many tributaries. The Rio Pecos which joins it in Texas drains the south-eastern part. In the north-east are streams which unite to form the Canadian River, and in the west are the headwaters of the San Juan, Little Colorado, and Gila, all affluents of the Colorado. In the river-valleys the soil is fertile and produces excellent crops; and many acres in other sections may be successfully cultivated by irrigation. The climate is healthful, and on the whole remarkably uniform, and the atmosphere is very pure and dry. The death-rate from pulmonary diseases is the lowest in the country. The rainy season occurs between the middle of July and the middle of September, lasting about a month. There are extensive forests on the mountains, and in the hilly regions of the western part of the territory, and on the pastoral plains nutritious grasses which support great numbers of cattle and sheep. The yucca and cactus are characteristic forms of vegetation, especially in the Llano Estacado. Stock-raising is one of the leading industries. The flocks and herds need no housing in the winter, but of late years more attention has been given to improvement of the breeds, and the stock, instead of roaming at will, is often confined within enclosed ranges.

Though one of the most recently settled portions of the Union, New Mexico was among the earliest regions occupied by the white man, and Santa Fé, originally an Indian pueblo, claims the title of the oldest town in the country. When the Spaniards first visited this region they found a people living in communities with substantial dwellings, and marking the decay of a civilisation which had flourished in previous centuries. In 1822 the people of New Mexico, in common with the other inhabitants of Mexico, of which it then formed a part, threw off the Spanish yoke. By the treaty of Guadalupe Hidalgo in 1848, after the war between Mexico and the United States, part of the territory was acquired by the latter nation. Additions were made by a later purchase from Mexico and by a cession from Texas. The population still includes about 100,000 Mexicans, as well as nearly 40,000 Indians. The territory when originally organised in 1850 included Arizona and parts of Colorado and California. The construction of railroads, begun in 1878, had a marked influence in its development. There are now about 1400 miles of railroad, connecting with either ocean and with all parts of the Union.

There are fourteen counties in New Mexico, and the principal cities and towns are Santa Fé (the capital), Albuquerque, Las Vegas, Fernandez de Taos, and Socorro. The educational system is not developed, though public schools have been established wherever it has been expedient, and there are a number of private and denominational institutions. An act was passed in 1889 authorising a state university at Albuquerque, an agricultural college at Las Vegas, and a school of mines at Socorro.

Newnham College, just outside Cambridge, but within ten minutes' walk of the centre of the town, may be said to have commenced in 1871, when the Newnham Hall Company opened a house for five resident women students. The numbers steadily increased, and in 1875 Newnham Hall was built, providing rooms for the principal, a lecturer, and twenty-six students. Scholarships were given by the London Companies and private friends, the library grew, a chemical laboratory and gymnasium were added, and the whole machinery of the college became more and more complete till, in 1879, the Newnham Hall Company was amalgamated with the Association for the Promotion of the Higher Education of Women. Additional land was acquired, and a second, and finally a third hall was added. These three halls, Old Hall, Sidgwick Hall, and Clough Hall, now form Newnham College, where at the present time 147 students, under the charge of a principal, two vice-principals, and five lecturers, receive instruction, partly by lectures delivered at Newnham, partly by such lectures of the university and colleges of the university as are open to them. In the year 1881 the university of Cambridge opened to students of Newnham and Girton its tripos and previous exams., and in 1889, out of thirty-five students of Newnham who entered for the tripos exam., six took a first-class, sixteen a second-class, and nine a third-class; while in 1890 Miss Fawcett was placed above the senior wrangler. Careful superintendence is here combined with a large amount of liberty and responsibility. The greater number of students work for tripos and stay for three or four years, but special courses of work can be taken without examination. The fees are 75 guineas a year.

New Orleans, the chief city of Louisiana, and one of the most important commercial cities in the United States, is situated on both sides of the Mississippi River—the greater portion on the east bank—107 miles from its mouth. Its corporate area is 187 sq. m., but a large portion of this is market-gardens, forest, and swamp, and only 48 sq. m. are built over, fronting on the Mississippi, and running back from half a mile to 3 miles. The city proper has a river frontage of 13 miles, and its western district, 'Algiers,' of 3 miles. The Mississippi makes two bends here, giving the old city a crescent-shaped front, whence its former title, 'The Crescent City,' but it is

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now the shape of the letter S. The river is from 600 to 1000 yards wide, and 60 to 240 feet deep. The bar at its mouth was removed in 1874–79 by the Eads jetties in South Pass, and vessels of 30 feet now easily reach New Orleans. The commerce of the city is large ($550,493,315 in 1890), and it is second in the United States in exports. New Orleans is the terminus of three canals, and of six large railroads (total mileage, 17,842) and three local lines, while twenty lines of steamships connect it with other American and foreign ports. Since 1875 it has made great progress in manufactures, particularly in cotton goods, cotton-seed oil, machinery, lumber, furniture, fertilisers, sugar-refining, rice-milling, beer, cigars, &c. Its factories increased from 554 in 1870 to 898 in 1880, and 2100 in 1890; and their product from $8,450,439 to $44,500,000.

The land upon which New Orleans is built is perfectly flat, and lies from 3 to 6 feet below the level of the Mississippi at high-water, and is protected from overflow by levees or dykes of earth. Similar levees in the rear keep out the waters of Lake Pontchartrain. The soil is saturated with water, and cellars are impossible. The climate is warm and damp, the mean temperature for the year being 69° F. The summer is tempered by winds from the Gulf, and is not oppressively warm. On account of its situation, the city is badly drained. It is without sewers; open gutters carry the rain-water into canals, and thence into Lake Pontchartrain, but they are insufficient, and the streets are frequently flooded after a heavy rainfall. The health of the city, however, has greatly improved within recent years; the death-rate has been reduced from 59 per 1000 in 1860 to 24·80 in 1890.

While it possesses few imposing buildings, New Orleans is a picturesque city. There are several parks little improved, but with handsome monuments or statues of Jackson, Lee, Franklin, and others. The custom-house of granite cost $4,500,000, and is the largest and most imposing building in the city. The cathedral of St Louis, a Gothic church erected in 1794, is a good sample of the Creole-Spanish architecture. The archi-episcopal palace (1737) is the oldest building in the city. Other noteworthy structures are the cotton exchange, United States mint, St Charles Hotel, and Christ and St Patrick's churches. There are 188 churches, and 78 public schools, with 430 teachers and 21,136 pupils enrolled. Tulane University (known as the University of Louisiana from 1834 to 1883) has 59 professors and 683 students. Under its control is the Sophie Newcomb Memorial College (1887), for the higher education of girls. The College of the Immaculate Conception (under the Jesuits) has 228 students. There are 4 colleges for negroes, males and females, with 1860 students. The Howard Memorial (1888), Tulane, and Louisiana state libraries, all free, contain together 120,000 volumes. The Charity Hospital (1784) is the largest institution of its kind in the United States, with accommodation for 800 to 1000 persons; and there are 54 other hospitals, asylums, &c.

The site of New Orleans was first visited in 1699 by Bienville, who in 1718 laid the foundations of the city, and in 1726 made it the capital. In 1763 it was ceded to Spain by France, with the rest of Louisiana; but when in 1765 the Spanish governor, Ulloa, attempted to take possession, he was driven out, and the people established a government of their own. In 1769 New Orleans was occupied by the Spanish, and the leaders in the late movement were shot. It was ceded to France in 1802, and transferred to the United States a few days later. Incorporated as a city in 1804, it was divided in 1836 into three separate municipalities, in consequence of the jealousies between the Creoles and the Americans; but the three were again consolidated into one in 1852. Since then New Orleans has annexed the neighbouring towns of Lafayette, Jefferson, Carrollton, and Algiers. Other outstanding events in the history of the city have been the battle of New Orleans (see JACKSON) in 1815; its capture in 1862 by the Federal fleet under Admiral Farragut (q.v.); serious political troubles in 1874 and 1877, resulting in 1874 in a battle on the levee between the citizens and the police and militia, in which 46 persons were killed and 216 wounded; and the lynching in 1891 of 11 Italian *maffiosi*. In 1880 the capital of Louisiana was removed from New Orleans to Baton Rouge.

Pop. (1769, when it was transferred to Spain) 3190; (1802, when it became American) 10,508; (1840) 102,193; (1880) 216,190; (1890) 242,039. The city is very cosmopolitan in race and language. Only 19 per cent. of the population is of American or English descent, 17 of Creole or French descent, 14 German, 12 Irish, 8 Italian, 5 Spanish, Scandinavian, Jewish, &c., 16 negroes, and 9 of mixed races, Indians, Chinese, and Malays.

New Plymouth, the chief town of the provincial district of Taranaki, New Zealand, 220 miles NW. of Wellington by rail. Two miles from the town extensive harbour-works are in progress. Pop. (1886) 3093.

Newport, a thriving town of Monmouthshire, and a parliamentary and municipal borough (the former conjointly with Monmouth and Usk), is seated on the river Usk, about 4 miles from its mouth, 24 miles SSW. of Monmouth and 145 W. of London. Being one of the principal outlets for the produce of the extensive collieries and iron and steel works in the vicinity (in 1889 upwards of 3,000,000 tons of coal were exported, and 28,900 tons of iron pyrites and manganese ore imported), its shipping trade has of late years greatly increased (1889: imports £873,156, exports £2,072,155), and with it, as a result, its dock accommodation, which now covers more than 80 acres. It has, too, many fine public buildings, prominent amongst them being the town-hall (1885), erected at a cost of £30,000, and St Woollos' Church, occupying an elevated site, and in style partly Norman and partly Perpendicular. Besides its shipping trade, Newport has manufactures of india-rubber, gutta-percha, and railway and telegraph plant and wagons, whilst several important brass and iron foundries are in operation, as well as breweries and pottery-works. On 4th November 1839 the town was the centre of a Chartist outbreak, which resulted in the death of ten persons, and the wounding of many more. Pop. (1801) 1087; (1881) 38,427, of whom 35,313 were within the municipal limits; (1891) 54,695.

Newport, a market-town of Shropshire, on the Shrewsbury Canal, 11 miles WSW. of Stafford. Chartered by Henry I., and burned in 1665, it has a 15th-century church, a grammar-school (1656), and manufactures of machinery and agricultural implements. Pop. of parish (1851) 2906; (1881) 3044.

Newport, the capital of the Isle of Wight, on the navigable Medina, near the centre of the island, 4½ miles S. of Cowes and 10 SW. of Ryde. The church, rebuilt in 1854–56 on the site of one nearly 700 years old, is a fine Decorated edifice, and contains Marochetti's beautiful monument, erected by Queen Victoria in memory of the Princess Elizabeth, who died at Carisbrooke Castle (q.v.) on 8th September 1650. Newport besides has a town-hall (1810); a free grammar-school (1612), the scene in 1648 of the protracted but fruitless negotiations between the parliamentary commissioners and Charles I., to whose secret 'engagement' a

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year before with the Presbyterian Scots the town also gave name; a girls' endowed school (1761); a diocesan school (1860); and a literary institute and museum. To the north-west are a reformatory (1838) and barracks (1798). A municipal borough, Newport returned two members till 1867, and then one till 1885. Pop. (1851) 8047; (1891) 10,216.

Newport, a town of Fife, on the Firth of Tay, 1½ mile by water SSE. of Dundee. It has a small harbour designed by Telford (1822), and municipal buildings (1890). Pop. (1841) 260; (1881) 2311.

Newport, (1) capital of Campbell county, Kentucky, is on the Ohio, opposite Cincinnati, and at the mouth of the Licking River, which separates it from Covington; both rivers are crossed by bridges, and there is also a steam-ferry to Cincinnati. The city contains large rolling-mills, a foundry, bolt-works, tile-works, and several steam-mills. Pop. (1880) 15,693; (1890) 24,338.—(2) A port of entry and one of the capitals of Rhode Island, on the west shore of the *island* of Rhode Island, in Narragansett Bay, 5 miles from the ocean, and 69 miles by rail S. by W. of Boston. It has a deep, excellent harbour, defended by Fort Adams; and there is a United States torpedo station on an island in the harbour. It contains a brick state-house, a custom-house, a city hall, the Redwood Library, many palatial villas, and large hotels; it is noted for fine scenery and sea-bathing, and is one of the most fashionable watering-places in America. In Touro Park stands the 'Round Tower,' or 'Old Stone Mill,' which suggested Longfellow's poem, 'The Skeleton in Armour.' The city also contains cotton-mills, a brass-foundry, lead and fish-oil works, &c. It was settled in 1638 by eighteen adherents of Roger Williams, and was an important commercial town prior to the Revolution, which effected its ruin and transferred its trade to New York. Newport was for a time the residence of Bishop Berkeley. Pop. (1880) 15,693; (1885) 19,466.

Newport-Pagnell, a market-town of Buckinghamshire, at the influx of the Ousel to the Ouse, 56 miles by rail NNW. of London. Named from the Paganels, who owned the manor in the days of Rufus, it was taken by Essex in 1643, and held two years later by Sir Samuel Luke, the prototype of Butler's 'Hudibras.' The fine parish church, restored by Street in 1858, is the principal edifice; lace-making has declined. Pop. of parish, 3686. See its *History* by Staines (1842).

New Red Sandstone, the name formerly given to the great series of red sandstones which occur between the Carboniferous and Jurassic Systems. The sandstones are now divided into two groups, the lower of which is assigned to the Palæozoic (see PERMIAN SYSTEM) and the upper to the Mesozoic System (see TRIASSIC SYSTEM). The term New Red Sandstone is used as synonymous in England with the Trias.

New River, an artificial cut, running 38 miles southward from Chadswell Springs in Hertfordshire into reservoirs at Hornsey and Stoke Newington. It was designed for the water-supply of London, and completed (1609–20) at a cost of £500,000 by Sir Hugh Myddelton, goldsmith, who died poor on 10th December 1631. The seventy-five original shares, sold for £100 apiece, sell now at the rate of from £85,200 to £94,500.

New Ross, a market-town and river-port of Leinster, Ireland, situated on the Barrow, partly in the county of Kilkenny, but chiefly in that of Wexford, 92 miles S. by W. of Dublin and 15 NE. of Waterford. The two portions of the town are connected by an iron swing-bridge (1869). Before the union New Ross—Old Ross lies 5 miles to the east—returned two members to parliament, and down to 1885 one. It was founded by the daughter of Strongbow, and was formerly fortified. The port can be entered at spring-tides by ships of 800 tons, and at all times by vessels of 200 tons; and there is communication by river and canal with Dublin and with Limerick. Pop. (1851) 7941; (1881) 6670.

Newry, a seaport and parliamentary borough, mainly in County Down, but partly in Armagh, on the Newry River, 38 miles SSW. of Belfast by rail. A canal connects it with Carlingford Lough and with Lough Neagh. The town is handsomely and compactly built, and the port does a large trade with Glasgow and Liverpool in cattle and other agricultural produce. Flax spinning and weaving, with rope and sail making, tanning, and granite-polishing, are the industries. The place dates from 1131; its castle was taken by Edward Bruce in 1318. Newry returns one member to parliament. Pop. (1851) 13,191; (1891) 13,211.

New Shoreham. See SHOREHAM.

New Siberia, a group of uninhabited islands in the Arctic Ocean, lying off the coast of Siberia between the mouth of the Lena and the mouth of the Indigirka. The principal are Kotelnoi (the largest), Liakhov, Fadeyeff, and New Siberia. The coasts are rocky, and ice-bound all the year round. The soil contains immense quantities of fossil ivory, of the mammoth, &c. See Petermann's *Mitteilungen* (1888).

New South Wales is the oldest colony of Australasia. It formerly included what is now known as Queensland, New South Wales, Victoria, South Australia, Tasmania, and New Zealand, all under the governor at Sydney. The area is now diminished to 310,700 sq. m. or 198,848,000 acres, being five times that of England. It has the Pacific to the east, from Point Danger, 28½° S. lat., to Cape Howe, 37½°; South Australia to the west, along the meridian 141° E.; Victoria to the south, by the Murray River; and Queensland to the north, from 29° S. lat. A series of mountain-chains, from 20 to 100 miles distance to the sea, extend from near Cape York to the Australian south-east corner. The southernmost are the Australian Alps, running over into Victoria, culminating in Mount Kosciusko, 7308 feet high. Northward are the Blue Mountains, west of Sydney, with peaks 4000 feet, and containing the Jenolan Caves (q.v.). Liverpool Range is more northerly; and the New England hills, north-east, rise 5000 feet. With the exception of some isolated mountains, the region to the west consists of vast plains, up to the Barrier Ranges near South Australia. The mountains give birth to short and rapid streams toward the sea, but long and sluggish ones westward. The Hawkesbury or Nepean, Hunter, Clarence, Shoalhaven, and Macleay are eastern. The Lachlan, 700 miles long, runs into the Murrumbidgee, which flows 1350 miles before falling into the Murray. The Murray, after 1100 miles on the New South Wales border, passes into South Australia. The Darling, rising in Queensland, has more than 1000 miles through the colony before reaching the Murray, the main receptacle of the country's waters. The Macquarie and Namoi go northward to the Darling. The dry interior has few streams. Among the few lakes are George, Bathurst, Illawarra, Macquarie, and Brisbane Waters—the last three sea-lakes. Twofold Bay is not far from Cape Howe. North of it are Jervis Bay, Botany Bay, Port Jackson, Broken Bay, Port Hunter, Port Stephen, Port Macquarie. The capital, Sydney (q.v.), is on Port Jackson, and is the headquarters of the Australian naval squadron. Near it are Windsor and Parramatta. Newcastle and Maitland are by the Hunter River. Goulburn

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and Bathurst are westward, Albany and Wentworth on the Murray, Bourke and Wilcannia on the Darling; Wellington is on the Macquarie, Wollongong by Illawarra, Deniliquin in Riverina, Silverton in the Barrier Ranges.

The colony was established in January 1788, under Governor Phillip, with a party of transported prisoners from England, as the former place of exile, America, was closed by the independence of that country. For years the settlement suffered much from want of food. The introduction of free colonists, to whom grants of land were given, promoted pastoral and agricultural pursuits; and the change from despotism to responsible government was gradually made. The cessation of transportation in 1840 was followed by social and political advance; and the gold discovery in 1851 gave a great impetus to the search for minerals. Town industries were developed; and commerce was aided by a fine harbour, an excellent mercantile marine, and the extension of railways.

As regards *flora*, the eucalyptus-tree prevails in the colony, but acacias also are common, and pines and cedars, as well as palms in the north-east. Forest preservation is now receiving official attention. In addition to products of native vegetation, plants of commercial value are being introduced, adapted to the warmer, colder, moister, or drier localities. Of 1600 economic plants in the colony, 210 are useful for food, 158 forage, 123 drugs, 57 oils, 87 tans, 60 gum-resins, 39 kinos, 14 perfumes, 35 dyes, 67 fibres, 630 timber. Some of these are available for export. There are more flowering plants than in all Europe.

The *fauna*, as in the rest of Australia, consists mainly of marsupial animals. In a single year there have been killed, as nuisances, 1,310,900 marsupials. Birds are of great variety, many of very beautiful plumage, and some of pleasant notes. Insects are pretty numerous, and not always welcome. Lizards and snakes may run to a good size, but there are no alligators. Fish, especially in the bays, are plentiful.

Geology.—Silurian and Devonian formations, with granitic, igneous, and metamorphic rocks, are rich in gold, silver, lead, copper, tin, and other metals. The hilly country forms the centre of mining industry, but the older rocks underlie the Tertiary and Post-Tertiary beds of the vast plains to the westward. Coal is seen in both Palæozoic and Mesozoic strata. The Cretaceous beds are confined to the north-west corner. Trappean irruptions are of various geological epochs; yet the colony has fewer recent volcanic, though extinct, craters than its Victorian neighbour. Marsupialian remains of huge dimensions are observed in the Pleistocene formations. Besides the monsters Diprotodon and Nototherium, there are the marsupial lion Thylacoleo, and the Thylacinus. In the Pliocene and Pleistocene are the alluvial gold workings and the diamond and tin washings. While the more ancient rocks prevail in the ranges, Mesozoic ones are nearly confined to the eastern side, north and south of Sydney, as the Sydney sandstone, and in the Clarence basin.

Gold, known in 1823, was first worked in 1851, near Bathurst. It is found over an area of 70,000 sq. m., in granite, porphyry, diorite, quartz, breccias, and alluvial deposits. Dry blowing is employed by miners where water is scarce. Gold is often mixed with silver, copper, or tin; and the ore is worth, according to purity, from 70 to 82 shillings an ounce. The output to the beginning of 1890 was nearly £38,000,000, though only £434,070 in 1889. Silver, found at Boorook, Sunny Corner, &c., abounds in the Barrier Ranges near South Australia, at Silverton, Thackaringa, &c., where there are over 4000 miners. Discovered in 1883, in an almost rainless region, the silver area is 100 miles by 12. One company paid in dividends £1,676,000 up to 1890, having raised 161,500 tons of ore, yielding 6,236,000 ounces of silver and 25,170 tons of lead. The district up to 1890 produced £4,168,397; the Broken Hill Company has raised 20,000,000 ounces; and in 1889 the product of silver for the colony was £1,971,198. Copper, first wrought in 1858, yielded £122,444 in 1889; its ore being known to extend over 8000 sq. m. Tin, worked since 1872, from streams and lodes in granite, has fields of equal area, with a yield for 1889 of £207,670. Lead is chiefly got from silver-mines. Antimony, manganese, bismuth, &c. are mined. Iron is abundant, but not profitable to work owing to the cost of labour. Precious stones, as the diamond, emerald, zircon, sapphire, topaz, &c., occur in granite localities. Asbestos, zinc, mercury, cobalt, and alum are exported. Graphite, kaolin, and building-stone enrich the colonists. Coal is the most valuable mineral of New South Wales. It extends over 24,000 sq. m.; £22,000,000 worth was raised during 1860–89; and the export of 28 million tons brought in £16,000,000. The yield for 1889 was £1,632,849, by 3,655,632 tons. Kerosene shale, rich in the Blue Mountains, yields 150 gallons crude oil per ton. Its product for 1889 was £77,667.

The *pastoral* resources are exhibited in the returns for 1889 of 50,106,768 sheep, in spite of a loss of 8,000,000 from drought in one year; cattle, 1,741,592; dairy cows, 248,894; horses, 430,777; swine, 238,585. Most of these animals are upon stations or runs, on land leased from government, sometimes at less than a penny an acre rental in the dry west. The leases are for twenty-one years in western divisions, ten in central, and five only in eastern, at a higher rent. The lessees are the squatters. In the early years of the colony only salt meat from England was in use, as there were no native sheep, cattle, or horses. The sheep imported from Bengal and the Cape were hairy, but the wool was improved by the introduction of Spanish merinoes; the cattle also were improved by good English stock. Pigs, goats, and poultry have been introduced. Wool exported in the year exceeds two hundred million pounds' weight.

Agriculture occupies far less land than pasturage. While 140,000,000 acres produce a rental of £917,190, being devoted to flocks and herds, there are but a million acres, or one acre to one inhabitant, devoted to culture, and nearly one-fourth of that is laid down in artificial grasses. But farming ground, especially near towns, is very valuable. Some of this is freehold, bought at government auction sales, though formerly bestowed in grants at a nominal quit rent. Much is leasehold, held at various rentals on terms of years from the state, till the full purchase is thereby effected. Of 46,197 holdings, 580 were over 10,000 acres each, and 6889 were under 15 acres. The land laws of New South Wales are liberal and easy to settlers. The country, however, is more pastoral than agricultural, growing less produce proportionately to its size than Victoria and South Australia. In March 1890 the area under crop was 947,072 acres, but 47,620 holdings contained 41,042,629 acres. In 1890 there were 419,758 acres in wheat, averaging 15 bushels to the acre; 173,836 in maize, averaging 30½; 5440 in barley; and 7867 in vines; hay, of various kinds, 222,262; sugar-cane, 18,730; oranges, 9804; tobacco, 3239; orchards, 16,867; market-gardens, 5409; potatoes, 17,551. Yet, while the colony exported £1,076,350 of agricultural produce in 1889, it imported £5,548,915. The sugar-plantations in the north-east are not so productive as in Queensland; nor are the apple-orchards and potato-furrows equal to those of

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Tasmania. But all the fruits that thrive in England and Italy grow here.

Climate influences vegetation in the colony. Farming facilities exist in the Dividing Range, the highlands of New England in the north-east, and the alpine slopes to the south, because of fair moisture. The seacoast, with from 40 to 70 inches of rain a year, differs much from the western interior, where in some years as little as 5 inches may fall. But the climate is so uncertain that a region may suffer from fearful drought in one season and floods in another. Cold and ice with heavy snows may be experienced on the lofty plains; but Sydney, 33° 50′ lat., had no snow in thirty years. Though in summer the thermometer might rise to 100° and beyond it during the day, the nights are generally cool and recuperative after the heat.

The *trade* exceeds that of any of the neighbouring colonies. It was worth £46,157,991 in 1889—£22,863,057 in imports, £23,294,934 exports. Each averaged over £20 a head, or about £16 in produce of the colony. The re-exports amounted to £5,871,623. While the United Kingdom sent £8,736,478 of goods, receiving from the colony £8,964,625, the Queensland trade was £6,415,553; the Victorian, £7,804,338; the American, £2,225,286; the German, £1,052,517; the French, £284,004; the Indian, £202,359. The colonial overland trade was £10,070,189. New South Wales imported £2,164,206 of drapery; £1,046,146, apparel; £852,304, iron and machinery; £741,189, flour; £466,390, spirits; £385,363, teas; £438,094, beer; £220,793, tobacco. Of exports, the home produce was £17,423,311; the foreign, £5,871,623. The animal and vegetable products realised £7,300,526; minerals and metals, £1,655,776; live-stock, £1,175,979; and coal, £1,319,271. The colony's wool of 1889 brought £10,620,636. Duties are only levied on forty-seven articles; there are none *ad valorem*, what is practically free trade having been established in 1872–79. The customs realised £1,905,883 and excise £261,371. There entered, in 1889, 3254 ships of 2,632,081 tons; departed, 3229 of 2,689,098. Of the tonnage, 4,659,798 were British; 661,381, foreign. Of the former, 2,817,071 were colonial; of the latter, 210,164 were American. While London cleared 5,284,149 tons, and Liverpool 4,758,525, Sydney cleared 1,432,340, and the Newcastle coal-port of the colony, 1,126,892. The *railways* connect New South Wales with South Australia, Victoria, and Queensland. Of 2263 miles, 2183 belonged to government, costing £32,000,000, and already paying 3½ per cent. on capital, the net earnings being 37 per cent.

Government.—The governor is appointed by the Queen. The executive is of 10 ministers; the Upper House or Legislative Council has 21 life-members; the Lower, or Legislative Assembly, 137 members, in 74 electorates, receiving £300 a year. The parliament is triennial. The revenue in 1825 was £71,682; in 1890, £9,517,121. From taxation was raised £2,758,750; from land, £2,208,039; from postal, railway, and other services, £4,253,830. The public debt, contracted for useful works, was £48,578,837 in October 1890. An excellent volunteer force comprises some 3500 men. In 1885 a New South Wales contingent was sent to strengthen the British forces in the Soudanese war. There is also a naval brigade. The wealth of the colony is stated at £314 per head, that of the United Kingdom being £270.

The *population* (1891), 1,134,207, of whom 518,199 were female, included 14,156 Chinese and 1997 aborigines. The ports, farming localities, and mines return seven-eighths of the people. About 3000 manufactories employ 49,238, wages for eight hours a day being from 8s. to 12s. The birth-rate is 33¾ per thousand; marriage-rate, 6¾; death-rate, only 13½. In religion, the Church of England claims one-half the population, the Roman Catholic nearly one-third; but returns for 1889 gave Sunday attendance at worship as follows: Roman Catholic, 94,422; Church of England, 83,819; Methodists (various), 64,900; Presbyterian, 33,247; Salvation Army, 14,423; Congregational, 13,669; Baptist, 4925.

Public schools are now unconnected with churches, and no state aid is granted to a denominational school; but one hour a day may be devoted to religious instruction in state schools, where parents present no objection. On the roll in 2964 schools are 229,043 pupils. The annual cost to the government of each child is £4, 14s.; the fees bringing in 12s. 5d. But there are many private schools. The Church of England has 36,342 children in Sunday-schools; Roman Catholic, 25,820; Methodist, 29,385; Presbyterian, 12,054. There are technological, industrial, and general museums, picture-galleries, public libraries, schools of arts, and mining schools; and a noble state university, having affiliated colleges, crowns the educational edifice.

See AUSTRALIA and works there cited; Dilke's *Problems of Greater Britain* (1890); R. Flanagan, *History of New South Wales* (1862); A. Trollope, *New South Wales and Queensland* (1874); Dr Lang, *Historical and Statistical Account of New South Wales* (1875); G. W. Griffin, *New South Wales, her Commerce and Resources* (1888); T. A. Coghlan, *The Wealth and Progress of New South Wales, 1889–90* (Sydney, 1890); G. B. Barton, *History of New South Wales from the Records* (16 vols. 1890 *et seq.*).

Newspaper, a sheet of paper printed and distributed at short intervals for conveying intelligence of passing events. This is a definition of a newspaper which might safely be employed for legal purposes; but it is altogether inadequate to describe the great institution which is now, in all parts of the civilised and semi-civilised world, at once the bearer of tidings, the herald of commerce, and, according to the predilections of its readers, a more or less accepted guide in matters of politics, theology, morals, arts, and sports.

The number of the newspapers of the world is (1891) estimated at 41,000, of which 24,000 appear in Europe. A further division, according to stricter geographical limitations, shows that Germany heads the list with 5500, then comes France with 4100, Great Britain and Ireland with 4000, Austria-Hungary with 3500, Italy with 1400, Spain with 850, Russia with 800, Switzerland with 450, and Belgium and Holland with 300 each. The rest of European newspapers are published in Portugal and the Scandinavian and Balkan countries. The United States of America must be credited with 12,500 newspapers. Canada claims 700, and Australia about the same number. Of journals issued in Asia, Japan alone has 200. Africa has 200 newspapers, and the Sandwich Islands three. Having regard to the respective popularity of the languages employed, it is found that 17,000 newspapers are published in English, 7500 in German, 6800 in French, 1800 in Spanish, and 1500 in Italian.

The newspaper came into existence when accounts of the imperial armies of Rome were sent to the generals in command in all parts of the provinces. These *Acta Diurna* were communicated by the generals to the officers under their command, and thus the foundation of a system of newspaper circulation was laid. It is to Germany that we have to look for the beginnings of modern European journalism. As early as the 15th century small news-sheets in the form of letters were issued in Augsburg, Vienna, Ratisbon, and Nuremberg. It was not until 1566, however, when the official

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Notizie Scritte were established at Venice by order of the Venetian government, that a news-sheet at all answering to present ideas was produced. At first they were not printed but written out, and exhibited in various public places, any one being permitted to read them on payment of the small coin called a *gazetta*. From this these journals acquired the title of *Gazette* (q.v.), and the demand for them was so great that it became necessary to print them. Gazettes were soon afterwards issued in most of the leading cities of Europe.

Setting aside the apocryphal history of the *English Mercurie*, said to have been published in 1588 under the sanction of Queen Elizabeth, the *Weekly News* of 1622, edited by Nathaniel Butter, is, so far as positive evidence goes, the first English newspaper, as we understand the term. The *London Weekly Courant* made its appearance in the same year. Twenty years later what has been called 'the era of the *Mercuries*' was entered upon, and *Mercuries* of many kinds claimed public patronage—amongst others the *Mercurius Clericus*, started in 1641 in the interests of the clergy; the *Mercurius Britannicus* (1642); the *Mercurius Civicus* (1643), whose first number contained portraits engraved on wood of Charles I. and Sir Thomas Fairfax; the *Mercurius Politicus*, published in London, and reprinted in Scotland for the entertainment of Cromwell's army; and the weekly *Mercurius Caledonius*, the first strictly Scottish newspaper, which, however, did not live beyond its tenth number. During the protectorate the newspaper press enjoyed the luxury of freedom, and there was a great increase in the number of political journals. In 1663 the *Public Intelligencer* was established by Sir Roger L'Estrange, but was suspended on the issuing of the *London Gazette*, the first number of which was published at Oxford on the 7th November 1665. A newspaper censorship, begun in 1662, was continued with more or less stringency during the reign of Charles II. and down to 1695, when the press licensing law was abolished. During that period there was no newspaper that could be properly so called except the *London Gazette*, which, as Macaulay puts it, 'contained nothing but what the secretary of state wished the nation to know.' Comments on political events rather than news formed the staple of such periodicals as were published during the existence of the censorship. There was the *Observator*, started by L'Estrange in 1681, which attracted some notice, but it was in no sense a newspaper. One of the earliest attempts at breaking down the barrier of exclusion was made in Worcester on the publication of *Berrow's Worcester Journal* in 1690, a paper which is still in existence. After the abolition of the censorship many new journals blossomed forth, including the *Postboy*, the *London Newsletter*, the *Flying Post*, the *English Courant*, and the *Lincoln, Rutland, and Stamford Mercury*. The *Edinburgh Gazette* was established in 1699, and published twice a week. It was not until 1702 that a daily paper was put forth in England. This was the *Daily Courant*, a small sheet printed on one side only.

Advertisements, which now form so important a factor in the prosperity of newspapers, did not appear in any journal, so far as can be ascertained, until towards the middle of the 17th century. Occasional books and pamphlets were advertised in 1647–48, and in 1649 a reward was offered in the *Moderate* for the recovery of 'a piebald nag;' but it was not until 1673 that anything like a regular system of advertising was established, when the *Index Intelligencer* opened its columns to paid announcements, at the rate of 'a shilling for a horse or coach for notification, and sixpence for renewing.' A little later the *Observator Reformed* was prepared to insert eight lines for a shilling; but, as the public began to awaken to the value of this new medium of publicity, the government became equally alive to its value to the revenue, and in 1701 imposed a duty of one shilling for each advertisement. In the same year a bill was brought into parliament for the purpose of enforcing a tax of one penny on every publication periodically issuing from the press. Owing to the representations of the newspaper proprietors, who pointed out that they had been in the habit of selling their sheets in many cases at a halfpenny a copy, the proposed measure was abandoned; but in 1712 a tax of one halfpenny per sheet was imposed on every newspaper of a sheet and a half. As a consequence, many newspapers at once ceased to exist, the *Observator* amongst the number. During the reign of George III. the press was subjected to several additional imposts. At the beginning of the reign the tax on newspapers was a penny a copy; in 1776 it was raised to three-halfpence; in 1789 to twopence; in 1794 to two-pence-halfpenny; in 1797 to threepence-halfpenny; and in 1815 to fourpence. With these heavy taxes on papers there was of necessity a corresponding increase in their cost to the public, until the general price reached sevenpence, a condition of things which lasted until 1836, when the duty was reduced from fourpence to a penny, the impost being entirely abolished in 1855. Another tax that affected the cost of newspapers was the paper-duty, which was repealed in 1861, leaving British journals free from imposts of any kind.

In spite, however, of the heavy burdens against which they had to struggle, through nearly the whole of the 18th and a great part of the 19th centuries, newspapers gradually increased in number and influence, and exercised much power in the directing of public opinion. In all the chief centres of population in the provinces, as well as in London, papers of importance were established. The first half of the 18th century saw a striking extension of journalistic enterprise. In the metropolis there was, in addition to the *Courant*, the *London Daily Post and General Advertiser*, established in 1726. This changed its title in 1752 to the *Public Advertiser*, and attained celebrity as the medium through which the Letters of 'Junius' were first given to the world. Defoe's *Review of the Affairs of State*, begun while the editor was in prison, existed from 1704 to 1713. The *St James's Post* and the *St James's Evening Post*, started as distinct journals in 1715, were by amalgamation as the *St James's Chronicle* assured of a long existence. The *London Post*, started in 1715, had the honour of publishing a reprint of Defoe's *Robinson Crusoe* as a serial story, commencing in No. 125 (7th October 1719) and concluding in No. 289 (19th October 1720). In 1731 there existed 22 journals in London and 23 in the provinces, amongst the latter being the *Edinburgh Courant*, the *Edinburgh Gazette*, the *Nottingham Journal*, the *Newcastle Courant*, the *Hereford Journal*, the *Liverpool Courier*, the *York Mercury*, the *Glasgow Courant*, the *Leeds Mercury*, the *Northampton Mercury*, the *Gloucester Journal*, the *Norwich Mercury*, and the *Ipswich Journal*. Still greater activity was displayed in the later half of the 18th century. It was in 1762 that the *North Briton* was first issued by John Wilkes, No. 45 of that notorious journal being the one which was burned by the hangman, and for which Wilkes was put in the Tower and cast in heavy damages. The *Morning Chronicle* was started in 1770, the *Morning Post* in 1772, and the *Morning Herald* in 1781. The *Times* (q.v.)—the chief and central figure of modern journalism—was started in 1788, as a development of the *Daily Universal Register*, which had existed from 1785.

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Mr John Walter was the originator and sole owner of both papers, and mainly through his energy and ability did the journal ultimately attain its position of pre-eminence. In the literary direction of the paper he always employed the highest available talent, while in the mechanical production of it he effected numerous improvements. In 1814 he succeeded in printing the *Times* by steam-power.

The publication of the leading London and provincial newspapers involves an immense outlay, and the co-operation of an army of experts representing every department of human knowledge. The work is now divided and subdivided in such a way that it is difficult to describe its organisation on the lines of the old official designations. It is no longer possible to speak unreservedly of an 'editor-in-chief' as having necessarily supreme power as the representative of the proprietors. So onerous and so various have the duties of that office become that it is, so to speak, frequently 'put into commission.' It is not uncommon to find a managing editor whose business it is to control in every way the supply of news, including foreign correspondence and reporting of all kinds, and a literary editor who controls the general policy of the paper, and is responsible for the style and substance of all original matter. It is increasingly rare to find an editor who writes any one of the several leading articles with which most of the great dailies furnish their readers. Each of these journals has a staff of leader-writers, who are often well-known workers in literature outside of journalism. On the principal newspapers the leader-writing staff includes experts of the highest mark, who are paid retaining fees in order that they may be in readiness, on the shortest notice, to supply essays on the subjects of which they are masters. For the leaders themselves they are paid special fees. A similar system prevails with respect to special correspondents, whether employed in a military or social capacity. George Borrow was the first war-correspondent, writing from Spain to the *Morning Herald* in 1839. Some of these gentlemen receive what Mr G. A. Sala has described as 'the wages of an ambassador,' in consideration of being always prepared to start for a campaign in 'Darkest Africa,' or to chronicle a royal progress. That the services rendered in return involves much personal danger is sadly suggested by the memorial in the crypt of St Paul's to the war-correspondents who fell in the Soudan. The sub-editors vary in number, according to the completeness of the organisation of the particular paper. The duties of the sub-editor on all important newspapers, whether metropolitan or provincial, have been almost revolutionised during the last four decades of the century. It is true that on the evening papers it is still necessary that the sub-editors should make a special study of the morning papers of the current date. This indeed enables the evening, or more properly speaking the afternoon, journals to appropriate the most interesting telegraphic items within a few hours of their appearance in the morning papers, to whose conductors such specially wired news may have caused a heavy expense. It may be noted that in some of the British colonies a law already exists giving copyright of 'exclusive' news for twenty-four hours after publication. On the whole, however, the sub-editor has almost ceased to be a gleaner in the fields which have been sown and already reaped by his colleagues. The old-fashioned sneer at the conductors of newspapers, that they 'put in anything to fill up,' is now only an amusing anachronism. Such are the 'services' of news which a daily paper is obliged to employ—whether they be those of the Press Association, the Central News, the Central Press, the Exchange Telegraph Company, Reuter's, or Dalziel's—that a sub-editor's trouble in leaving his work is to reconcile the amount of 'flimsied' matter which he has put into the waste-paper basket with his duties to his chiefs. Reuter's Agency was founded in 1858, the Central Press in 1863, the Press Association in 1868, and the Central News Agency in 1870.

There used to be twelve or sixteen parliamentary shorthand reporters on every London daily. At that time the daily provincial papers obtained their telegraphic reports of parliament solely from one or other of the news organisations. This is now changed. The chief papers in the provinces have formed syndicates in accordance with their respective politics for the purpose of obtaining special reports of the debates from their own associated staffs of reporters. This arrangement, which parliament sanctions, enables the leading provincial dailies to supply parliamentary reports according to their own special requirements, the result being that debates are frequently reported at greater length in those papers than in the London journals of the same date. Thus it arises that the chief provincial papers have offices in the neighbourhood of Fleet Street or the Strand, where a special wire or wires will connect the London and the country offices. Formerly the journalists who were in charge of these wires were styled the 'wire men;' now they are designated London editors. In the city there are also editors whose special functions are the furnishing of information connected with financial matters to various papers. The chief London dailies retain the exclusive services of a city editor, while several provincial journals, published in different localities, are served by one and the same city editor. These remarks apply also in a modified degree to colonial and even foreign newspapers, which often have their own special services of news, and special representatives, in London and other principal cities.

Another important representative of modern newspaper enterprise is what is known as the London correspondent. There were London correspondents of a kind even in the days of the Restoration, but it was not until 1863 that the 'London letter,' as it is now known, was introduced as a special feature of provincial papers. In that year the Central Press Agency proposed to supply their clients with 'a London letter once a week, written by a gentleman of long standing in the literary world.' This was the late Edward Spender, who for some years continued to write what formed an admirable compendium of the week's political, social, and literary gossip for country readers. As time went on the weekly letter became a daily contribution, and other London correspondents entered the field, until now the London letter is an indispensable feature of all provincial journals. Many well-known journalists are engaged in this work, including several members of parliament, and the lobby of the House of Commons forms their chief hunting-ground.

In 1843 the number of newspapers published in London was 79; in 1880 it was about 340; in 1890 it had increased to 646. Of these 28 are daily, 9 of which are issued in the evening (nominally), their first editions being issued about noon. The price of these papers is either a penny or a half-penny, with the sole exception of the *Times*, which continues to be published at threepence. The list of daily papers, which formerly consisted almost entirely of political journals, has during recent years been increased by the appearance of several daily sheets devoted exclusively to financial and commercial matters. Financial journalism, indeed, forms a very special feature of modern newspaper enterprise. The *Economist*, established in 1843, and a few other weeklies of kindred aims, held this

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ground with success for many years, but the great speculative rush of more recent times, consequent on the altered conditions brought about by the passing of the Limited Liability Acts, has produced a vast number of papers of this class, the *Financial News*, started in 1884, and the *Financial Times*, founded a little later, being amongst the more widely circulated of financial daily newspapers. And again, not only does a fully-illustrated newspaper, the *Daily Graphic* (1890), appear every morning, but many of the other daily journals give illustrations of current events with more or less frequency. The difficulties of producing clear illustrations by the rotary printing-machines which are necessitated by large circulations are being gradually overcome.

Of purely literary journals the number is not large. The *Athenæum*, founded in 1828, is devoted exclusively to books, authors, science, art, music, and the drama. The *Academy*, established in 1869, follows on similar lines; and there is also the *Literary World*, covering much of the same ground. Prominent success has been achieved, however, by several weekly journals which, while devoting special attention to literary criticism, have by their free, frank, and able handling of political and social subjects made themselves both feared and admired. The *Examiner*, established by Leigh Hunt in 1808, lost ground after Hunt's retirement in 1821, but five years later, when Albany Fonblanque succeeded to the post, it again became a power, and for many years remained the champion of Radical thought. The *Spectator*, edited by Rintoul, also held a strong independent position about this period. Both papers were much read by the cultured classes; but after changes of editorship and policy a term of decadence set in; and when, in 1854, the *Saturday Review* made its appearance, controlled and contributed to by some of the brightest intellects of the day, a great stride in advance was made, and the weekly review became as influential as the great quarterlies had been in former days. About the same time the *Spectator* was remodelled by R. H. Hutton and Meredith Townsend, and has ever since stood high as the representative of what may be termed the Philosophical Radicals. The *Speaker*, established in 1890, is edited by Mr T. Wemyss Reid, and is the organ of the more advanced Radicals. The *National Observer*, published simultaneously in London and Edinburgh, also holds prominent rank as a political and literary review, is as daring in tone as the *Saturday Review* was in its earlier career, and is uncompromisingly Conservative. What is called 'society' journalism represents a new departure that dates from the first publication of *Vanity Fair* in 1868, and which received a conspicuous strengthening by the issuing of the *World* in 1874, and *Truth* in 1877. These papers, and a host of journals that have been published in imitation of them, have made the writing of personal paragraphs and articles a leading feature; one of the results being a marked increase in the number of libel suits. The combination of the personal and sensational elements constituting what it is customary to describe as the 'new journalism' likewise calls for mention. Cradled in America, it was boldly adopted in England by Mr W. T. Stead in the early days of his editorship of the *Pall Mall Gazette*, and eagerly taken up by numerous others.

The following figures will give some idea of the magnitude of the newspaper press of the United Kingdom, and also of its classification: Daily morning papers, 85; daily evening papers, 126; papers published in England outside London, 1318; in Scotland, 241; Ireland, 192; Wales, 90; the Channel Islands, 14; the Isle of Man, 7.

In the following analysis of class and trade journals it has been found practically impossible to differentiate between newspapers properly so called and other periodicals. Occasionally, too, a journal will appear under more than one classification. The distribution of papers according to subjects, however, may be thus distinguished: Accountants, 2; agents, 3; agriculture, 30; antiquities, 3; anti-vaccination, 1; architecture, 8; army, 11; art, 16; astronomy, 1; athletics, 12; auctioneers, 3; bakers, 3; banking, 1; Baptists, 11; bees, 3; bells, 1; booksellers, 9; boot and shoe trades, 2; botany, 2; boys, 6; brewers, 4; builders, 13; building-societies, 2; butchers, 1; carpenters, 1; caterers, 3; cattle-dealers, 2; charities, 5; chemists and druggists, 10; chess, 3; Church, 47; civil service, 8; coach-builders, 2; coal trade, 2; colonies, 21; comic, 30; commercial, 41; confectionery, 3; contracts, 4; co-operation, 4; country, 7; county courts, 1; cow-keepers, 1; cricket, 1; cycling, 5; decoration, 6; dental, 3; dogs, 5; drama, 13; drapers, 4; dyers, 1; education, 23; electricity, 6; engineering, 10; entomology, 1; estates, 7; exchange, 4; fashions, 37; financial, 39; fire, 2; fishing and fish-trades, 4; food, 3; freemasonry, 4; Free Methodists, 2; friendly societies, 4; Friends (Society of), 3; fruit trades, 2; furniture, 8; gardening, 16; gas, 3; geographical, 2; geology, 1; German, 2; grocers, 9; gynecology, 1; hairdressers, 2; hardware, 1; hatters, 1; homœopathy, 2; horology, 2; horses, 2; hosiers, 1; illustrated, 14; implements, 1; India, 6; india-rubber, 1; insurance, 18; inventions, 3; iron and ironmongers, 7; jewellers, 1; Jewish, 4; labour, 4; laundry, 3; law, 18; leather, 5; licensed victuallers, 6; lifeboats, 1; literary, 18; live-stock, 7; local government, 6; machinery, 3; matrimonial, 2; mechanics, 3; medical, 26; meteorology, 1; millers, 2; mineral waters, 4; mining, 3; music, 18; natural history, 6; navy, 14; Nonconformists, 13; non-sectarian (religious), 46; notes and queries, 2; numismatics, 1; official, 2; oil and colour trade, 2; paper trades, 10; pawnbrokers, 1; peace, 1; photography, 10; phrenology, 2; plumbers, 1; pottery, 1; poultry, 8; Presbyterian, 3; Primitive Methodist, 7; printers, 12; railways, 10; Roman Catholic, 15; saddlers, 3; sanitary, 8; scientific, 6; secular, 3; shipping, 14; shorthand, 3; society, 24; sporting, 40; stamps, 1; Sunday-schools, 6; tailors, 3; telegraphy, 2; temperance, 32; textile industries, 11; timber trade, 2; time-tables, 36; tobacco, 4; undertakers, 1; Unitarian, 2; warehousemen, 3; Wesleyans, 6; wine and spirits, 4; yachting, 1.

The circulations attained at the present day by the leading metropolitan and provincial papers is in some instances very large. The *Daily Telegraph* and the *Standard* each circulates close on a quarter of a million copies. Amongst the London evening papers the *Star*, the *Echo*, and the *Evening News and Post* each claims a circulation of 200,000 copies or thereabouts. Of the penny weeklies, *Lloyd's Newspaper* heads the list with half a million copies, and a further half-million is divided between the *Weekly Dispatch* and *Reynolds's Newspaper*. Other London circulations are the *Police News*, 300,000; the *Referee*, 150,000; the *Illustrated London News* and the *Graphic*, from 120,000 to 130,000 copies each. In the provinces there are the *Yorkshire Post*, 45,000, the three Manchester morning papers (with a combined issue of at least 100,000), and the *Birmingham Post*, 30,000, amongst the morning dailies; and a glance at the list of provincial weeklies gives us the *Sheffield Weekly Telegraph*, 215,000, the *Glasgow Weekly Mail*, 200,000, the *Dundee Weekly News* and *People's Journal*, 200,000, the *Newcastle Weekly Chronicle*, 100,000, the *Manchester Weekly Times*, 100,000, and the *Sunday*

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Chronicle (Manchester), 200,000. It should be mentioned also that since 1882, when *Tit-Bits* was started, there have sprung into existence a large number of journals which are neither strictly newspapers nor magazines, but are widely popular. *Tit-Bits* has a circulation of over half a million copies per week. Following in its train are such papers as *Rare-Bits*, *Illustrated Bits*, *Answers*, &c., all of which sell largely.

As already mentioned, the newspaper press of Scotland had its origin during the civil wars of the 17th century, a printer named Higgins, attached to Cromwell's army, being employed to reprint the London *Mercurius Politicus* for the benefit of the troops then in Scotland. This issue was continued from 1653 to 1660; in which latter year the *Mercurius Caledonius* was published, existing only for three months, and being succeeded by the *Kingdom's Intelligencer*. In 1669 came the *Edinburgh Gazette*, in 1702 the *Edinburgh Courant*, in 1706 the *Scots Courant*, and in 1718 the *Edinburgh Evening Courant*. In 1720 the *Mercurius Caledonius* was revived as the *Caledonian Mercury*, and survived until the middle of the 19th century. The *Scotsman*, which may be regarded as the *Times* of Scotland, came into existence in 1817, the *Glasgow Herald* in 1782, the *Aberdeen Journal* in 1746, the *Kelso Mail* in 1797, the *Dundee Advertiser* in 1801, the *Ayr Advertiser* in 1803, the *North British Daily Mail* in 1847, and the *Scottish Leader* in 1887.

In Ireland, a news-sheet called *Warranted Tidings from Ireland* saw the light during the rebellion of 1641, but the *Dublin Newsletter*, started in 1685, was the first Irish newspaper properly so called. A Dublin daily, called *Pue's Occurrences*, ran from 1700 to about 1750; and *Faulkner's Journal*, another Dublin daily journal, was started in 1728. *Saunders's Newsletter*, established in 1746, existed down to 1879. The Dublin *Evening Post* was first issued in 1725; and in 1737 the *Belfast Newsletter*, the oldest existing Irish newspaper, was started. The *Derry Journal* was established in 1772, the *Limerick Chronicle* in 1766, and the *Belfast Northern Whig* in 1824.

The English papers of the principality of Wales show evidences of the pressure of a public demand which every year becomes more exacting. In the northern division, a thinly-spread population have still to be content with weekly papers—Welsh and English—with the addition of such daily supply as is afforded by the Liverpool press. The tenacity with which the masses cling to the native language enables the *Baner* of Denbigh to hold a commanding position among the newspapers of North Wales. A different condition of things obtains in the busy centres of South Wales, with its vigorous industrial life and populous communities. Two daily papers share the patronage of the South Walian. The *Western Mail*, a progressive Democratic-Conservative journal, is the senior in point of age. The *South Wales Daily News* is the organ of the advanced Liberalism professed by the majority of South Wales electors. Both papers are published in Cardiff. Each populous district has its local journal, and the vernacular press is supported by a large, but diminishing, class.

In the different British colonies newspaper enterprise has been very active in recent years. As far back as 1803 the Australian colonies were catered for by the *Sydney Gazette and New South Wales Advertiser*, which was published 'by authority.' The *Australian*, also issued in New South Wales, was originated in 1824, but succumbed in 1848. In 1831, however, the *Sydney Morning Herald* was established, and has long held the position of being the most substantial paper in the colony. In Victoria the *Melbourne Advertiser* was the progenitor of the existing race of Victorian journals. At first it was written, not printed, and had a circulation of not more than a dozen copies at sixpence a copy. It ceased with its thirty-second number. The *Argus* and the *Age*—the latter reputed to have the largest circulation of any in Australia—now hold the first rank. South Australia has in the *Register* a journal which has been published daily since 1850. There are not more than about a score of journals in Western Australia, the number including three dailies. The *Brisbane Courier* is the patriarch of journalism in Queensland. There are two other dailies in Brisbane, and about seventy papers altogether in the colony. In Tasmania the newspaper press began to have a history in 1810. There are four dailies in the colony, and about twenty others. In New Zealand there are no fewer than fourteen towns which have daily papers, besides more than a hundred other journals published throughout the island.

In the South African colonies the *Cape Times*, although it was only established in 1876, takes the lead. In Johannesburg English enterprise has a great daily paper in the *Cape Argus*. The *Cape Mercury*, published three times a week, was established in 1875 in King William's Town. Natal has three daily papers and many weeklies. On the Gold Coast, in Sierra Leone, St Helena, Mauritius, British Guiana (which has a daily paper at Georgetown), and the West Indies (with a daily journal in Jamaica) British journalism is more or less well represented. Even Cyprus has its weekly *Ovl*. China claims to have had newspapers before they were known in Europe, and we are specially interested in the three or four English dailies published in Hong-kong.

In India we find an English press powerful and influential out of all proportion to the extent of its circulation. Every European British subject in India, who has brains and character, is the centre of a social system. To him the newspaper, which constitutes the link between his early home and the scene of his daily labour, is an infinitely more important institution than the British journal is to the citizen of London or Liverpool. The *Englishman*, a daily paper published in Calcutta, first made its appearance in 1821, under the title of the *John Bull in the East*, and had set up at its press the rough proofs of several of Macaulay's best-known essays. There are two other dailies in Calcutta, while Bombay, Madras, Allahabad, Delhi, Lahore, and Rangoon have each one or more daily newspapers. Many journals are issued in English by natives for native readers, and the sheets printed in the vernacular languages are legion. The small cost of native labour largely aids the multiplication of Indian journals.

United States and Canada.—In 1890 there were issued in the United States and Canada a total number of 17,760 newspapers and periodical publications, consisting of 13,164 weeklies, 2191 monthlies, 1626 dailies, 280 semi-monthlies, 217 semi-weeklies, 126 quarterlies, 82 bi-weeklies, 38 bi-monthlies, and 36 tri-weeklies. The geographical distribution of the 17,760 periodicals is as follows: New York state, 1778; Illinois, 1309; Pennsylvania, 1281; Ohio, 1043; Dominion of Canada, 812; Kansas, 807; Iowa, 799; Missouri, 756; Massachusetts, 685; Indiana, 651; Michigan, 644; Nebraska, 565; California, 536; Wisconsin, 529; Texas, 494; Minnesota, 427; New Jersey, 318; Colorado, 268; Georgia, 257; Kentucky, 257; South Dakota, 250; Tennessee, 236; the Territories, 220; Virginia, 220; North Carolina, 192; Arkansas, 185; Connecticut, 182; Maryland, 178; Alabama, 175; Maine, 156; Mississippi, 155; Louisiana, 152; Washington, 146; West Virginia,

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143; Oregon, 133; New Hampshire, 126; Florida, 121; South Carolina, 120; North Dakota, 119; Vermont, 83; District of Columbia, 68; Rhode Island, 64; Montana, 58; Delaware, 38; Nevada, 24. It is estimated that the total issue of a single edition of all these papers represents a circulation of 41,524,000 copies, being an average edition of 2335 copies. According to classification it is found that there are 27 publications with circulations of 150,000 for each issue, 28 with 100,000, 35 with 75,000, and 42 with 50,000; while at the other end of the scale there are 5426 publications classed as issuing only 500 copies per issue. New York prints more than a quarter of all the papers which are sold, and Pennsylvania, Illinois, and Massachusetts more than another quarter. Nearly 75 per cent. of all the publications issued appear weekly. Reckoning the combined population of the United States and Canada at 65,000,000, the circulations given are sufficient for three yearly subscriptions to every five people.

The earliest newspaper published in America was *Publick Occurrences*, 1690; this was followed in 1704 by the *Boston News-letter*, which continued without a rival until 1719, when the *Boston Gazette* was issued 'by authority.' Later on the *News-letter* extended its title, and became the *Massachusetts Gazette and Boston News-letter*, and was conspicuous for its support of the British rule in the early days of the war of independence, ceasing to exist, however, when the English troops evacuated Boston. In 1721 the *New England Courant* was established by James Franklin, and subsequently was conducted by his more renowned brother, Benjamin Franklin. The latter started a paper of his own, the *Pennsylvania Gazette*, in 1729, after the death of the *Courant*, and this appeared weekly down to 1745, when it merged in the *North American*. Edes's *Boston Gazette*, begun in 1755, was for a long time the chief organ of the popular party, and was the medium through which John Adams published his 'Letters of Novanglus.' The *Massachusetts Spy* was another paper of note on the revolutionary side. On being removed from Boston to Worcester its title was changed to the *Worcester Spy*. At the revolution the New England colonies possessed 14 newspapers; Pennsylvania, 9; New York, 4; and the middle and southern colonies, 10. All save the semi-weekly *Advertiser* of Philadelphia were published weekly. From this period onward the progress of American journalism was marked by rapid strides; it extended by leaps and bounds, developing an originality all its own, and displaying an activity in some directions altogether out-distancing the achievements of Great Britain.

What the existing journalistic enterprise of the North American continent represents has already been indicated; it is desirable, however, that some of its more salient features should be referred to. American papers have always been more strongly personal than English journals. It is to the transatlantic reporter that we owe the introduction of 'interviewing' and the invention of 'head-lines,' amongst other things. No effort is spared to make an American newspaper understanded and admired of the people; it gives news in abundance, usually presented in a sensational manner, and vents its views and opinions with what an English journalist would regard as a reckless unrestraint. The organisation and equipment of the leading papers of the chief cities are most complete, including an editorial and reportorial staff of many subdivisions, backed by a proprietary of remarkable vigour and enterprise. The great majority of American and Canadian papers are, of course, printed in English, but there is a considerable number published in other tongues. Those published in the German language number 724, while 112 are in French, 59 in the Scandinavian languages, 34 in Spanish, 16 Bohemian, 12 Dutch, 7 Polish, 4 Danish, 5 Welsh, 8 Finnish, 5 Italian, 2 Portuguese, 2 Chinese, and 2 Hungarian. The principal papers of America and Canada have a world-wide renown. The *Herald*, originated by James Gordon Bennett, the *Tribune*, founded by Horace Greeley, the *World*, the *Times*, the *Sun* are the chief papers of New York; and in Chicago, Boston, Baltimore, Cincinnati, Philadelphia, St Louis, San Francisco, and other cities there are journals hardly less famous. Amongst the chief Canadian papers may be mentioned the *Toronto Globe*, which claims to be the leading paper of the Dominion, the *Montreal Herald*, the *Quebec Morning Chronicle*, the *Ottawa Free Press*, and the *Ottawa Citizen*. There is a considerable sprinkling of Canadian papers printed in French, the chief of them appearing in Quebec and Montreal. The Sunday paper has long been a specially popular institution in America. Nearly every prominent daily in the States issues its enlarged Sunday edition, which in addition to its news proper contains a vast amount of miscellaneous reading, culled from all kinds of sources, and often including special contributions of great merit. In Canada Sunday papers are not so common.—In some of the large cities of South America, also, as in Rio de Janeiro and Buenos Ayres, there are ably conducted English newspapers.

France.—Journalism in France began with the *Gazette* in 1631. The first French daily paper was the *Journal de Paris*, started in 1777. Many journals sprang into existence with the Revolution, but most of them had but a brief career. Under the first Napoleon the freedom of the press was much restricted. It was then that the danger attending the handling of political questions suggested the filling of a large portion of the sheet with the 'Feuilleton' (q.v.). There are at present about 44 daily papers (morning and evening) published in Paris alone. As newspapers, in the full sense of the phrase, the journals of France cannot be compared with those of Great Britain. They contain less matter, and they do not, as a rule, report with any degree of fullness home or foreign events. The *Temps*, which is said to have a circulation of 45,000 per day, approaches somewhat to the English standard; but the *Figaro*, which, with its singular mixture of clericalism and worldliness, would be considered frivolous in England, has a circulation of 100,000 daily. French daily papers generally cost at least twice as much as English ones. A notable exception, however, is found in *Le Petit Journal*, an evening paper costing 5 centimes (one halfpenny), which has probably the largest circulation of any paper in the world; it is put down at 950,000. See also GALIGNANI.

Belgium.—An illustrated war-gazette called the *Niewetijdinghe* was the first journal published in the Low Countries, in 1605, and was succeeded by the *Gazette van Antwerpen*, which survived until 1805. The Belgian newspapers are now numerous, including about a dozen daily journals in Brussels, and half that number (mainly in Flemish) in Antwerp. The *Indépendance Belge*, on the Liberal side, and the *Journal de Bruxelles*, as the organ of the clerical party, with the *Étoile Belge*, are the leaders of public opinion.

Holland.—The newspapers of Holland were at an early date remarkable for the fullness and accuracy of their intelligence; but until 1830 their news was chiefly confined to commercial matters. The principal Dutch journals of to-day are the *Allgemeene Handelsblad* of Amsterdam, and the *Amsterdam Courant;* the *Harlemsche Courant;* and the *Journal de la Haye*, *De Nederlandsche*

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Stoompost, and *Staats-Courant*, published at the Hague.

Switzerland.—Although the Swiss press is generally speaking ably conducted, it does not include any journal of European importance. The different cantons have their local newspapers, in which local matters are discussed with much political bias, and latterly there have been published one or two Swiss journals printed in French and English, and intended mainly for the travelling public, the *Swiss Times* being the first of these.

Germany, as we have seen, was furnished with news-sheets long prior to their introduction into England; but it was not before 1615 that any German newspaper had a really settled habitation. Frankfort was the first town to possess a journal of its own; Fulda, Hildesheim, and Herford followed. The first Leipzig newspaper was published in 1660. The *Hamburgsche Correspondent* deserves mention as the first paper to organise a staff of foreign correspondents. In 1798 the *Allgemeine Zeitung* was established by Cotta, and gradually made its way into the front rank of European journals, being still regarded as the leading paper in Germany. Severe restrictions have fettered the German press even in recent years, the government having exhibited no little animus against the many socialistic journals which have sprung into existence, but now comparative freedom is enjoyed. Berlin owns a large number of daily papers, including the *Vossische Zeitung*, the *Norddeutsche Allgemeine Zeitung*, the *Neue Preussische Zeitung*, the *Post*, the *National Zeitung*, and the *Volks-zeitung*. The *Cologne Gazette* is a paper of influence, and at Hamburg and other leading towns there is considerable journalistic enterprise. In 1833 Germany had 350 journals of all kinds; it has now 5500, about a quarter of which were until recently avowedly government organs—hence the vogue of the term 'Bismarck's reptile press.'

Austria.—Austrian journalism has similarly expanded and improved in recent years. Vienna is a very active centre, and within its boundaries many excellent papers are issued, the *Neue Freie Presse* and the *Neue Wiener Tagblatt* being the most important.

Hungary.—The literary activity of Hungary may be judged by the fact that there are no fewer than 17 papers published daily in the capital, some of them having a circulation of 25,000.

Denmark.—Up to 1830 only two newspapers were printed in Copenhagen, and both were entirely made up of extracts from foreign journals. The official paper, the *Berlingske Tidende*, which was established in 1749, is published daily, and has a circulation of 10,000. There are ten daily journals published in the capital, and the *Aftenposten*, an evening paper, has the largest circle of readers.

Sweden and Norway.—The *Ordinarie Post Tidende*, started in 1643, seems to have been the first Swedish paper. Stockholm now boasts four daily journals, the *Stockholm Dagblad* having a circulation of 23,000. *Den Morgenblad* is the leading paper of Norway.

Spain.—Spanish journalism cannot be said to have really existed until a comparatively recent period. There was no liberty of the press in Spain until after the revolution of 1854. The chief daily journals of Madrid are the *Correspondencia de Espano* and the *Imparcial*, the former having a circulation of about 50,000, the latter of some 70,000. The press of Portugal is not more flourishing than that of Spain.

Italy.—Mention has already been made of the early *Gazettes* of Italy. Their successors were denounced by the popes, especially by Gregory XIII., and up to 1847 the Italian press was of small account. A rigid censorship existed until far into the 19th century. There are now fifty daily papers published in Italy, chiefly in Rome, Bologna, Florence, Genoa, Milan, Leghorn, Naples, Palermo, and Turin. The *Secolo* of Milan is credited with a daily circulation of 120,000.

Russia.—Peter the Great was the author of Russian journalism. Political journalism, however, is practically forbidden in the dominion of the czar, the papers occupying themselves for the most part with literary and scientific questions. The *Journal de St Petersbourg* (1824) is semi-official, and, though it has but a small circulation, it is well known throughout Europe, being published in French. The two daily papers of largest circulation are the *Novoe Vremya* ('New Times'), the organ of the popular party, and the *Novossti* ('Latest News'), which represents the doctrinaire Liberals.

Turkey.—Journalism in Turkey is chiefly of foreign origin, and the French were the first to exploit this form of enterprise in the land of the sultan. Any opposition to the government is not permitted, therefore the Turkish papers contain no leading articles. Some fourteen sheets, however, are issued daily in Constantinople, in Turkish, French, or English. The leading Turkish journal, the *Djeridei Havadis*, was established in 1843 by an Englishman.

See the articles REPORTING, ADVERTISING, and PRINTING; also Andrews' *History of British Journalism* (Lond. 1859); Grant's *The Newspaper Press: its Origin, Progress, and Present Condition* (Lond. 1871); H. Fox Bourne's *English Newspapers* (Lond. 1887); Pebody's *English Journalism, and the Men who have made It* (Lond. 1882); Baker's *The Newspaper World* (Lond. 1890). A very valuable and extensive collection of early newspapers is to be found in the British Museum.

Newstead Abbey, 10 miles NNW. of Nottingham, on the border of Sherwood Forest, was founded for Augustinian Canons by Henry II. in atonement for Becket's murder (1170), and in 1540, after the dissolution, was given to 'Sir John Byron the Little, with the great beard.' Among his descendants were the first Lord Byron (cre. 1643), the 'wicked Lord Byron' (1722–98), and the poet Lord Byron (q.v.), who made the half-ruinous old place his home in 1808, but sold it in 1818, since which time about £100,000 has been spent on its restoration. For a full description of Newstead, its lake, ruined church, superstitions, and memories, see Washington Irving's *Abbotsford and Newstead* (1835).

New Style. See CALENDAR, CHRONOLOGY.

New Sweden. See PENNSYLVANIA.

Newt, or EFT (*Triton*), a genus of caducibranchiate Amphibians (q.v.), corresponding in many respects to the Salamanders, but more slender and active, and making up with them the family Salamandridæ. The newts have a soft, sensitive skin, covered with warty tubercles or granules; a laterally-compressed tail; four fingers and five toes; teeth on the jaws and palate; an upper and a lower eyelid, and a third eyelid or nictitating membrane; small nostrils near the snout, opening internally into the mouth; and generally well-developed organs of the lateral line. They are found in marshes and ponds and damp places. In habit they are carnivorous, devouring insects of various kinds, worms, snails, frog-spawn, and even smaller animals of their own kind. Sixteen species are enumerated, widely distributed in Europe, and found also in Algeria, North China and Japan, the eastern states of North America, California, and Oregon. The Great Water Newt, or Warty Newt (*T. cristatus*), is the largest British species. It is about 6 inches long; the body is thick and round, the upper parts are generally very dark, the sides are dotted with white, and the breast and belly are of a bright orange colour,

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with black spots. The male is more vividly coloured than the female, the sides of the tail are of a beautiful pearly colour, and at the breeding season he develops a large back crest (fig. 1). The movements

Fig. 1.—Great Water Newt (*Triton cristatus*).

in slow swimming are accomplished by means of the tail and the limbs; but in fast swimming both pairs of limbs are laid alongside the body, and the movements are effected by rapid undulations of the body and tail. On land they crawl by means of their weak limbs. In summer they cast their skin perhaps many times, sometimes by complete sloughing, but sometimes it comes off in shreds. In winter they generally remain at the bottom of ponds and ditches. Like many other animals of the same genus, they show great power of reproducing lost parts, the tail, limbs, and portions of the head being very perfectly restored, even several times in succession. They are also able to withstand great cold. In laying her eggs the female deposits them on the leaves of aquatic plants, each egg being deposited separately below a leaf, which is then folded, apex to petiole, by means of the newt's hind-limbs, so as to retain the egg in position. The embryo grows rapidly and becomes bent in shape. In seven days the gills and legs appear as small knobs. By the ninth day the tail is oar-shaped, and the heart may be seen beating. On the tenth day the fore-limbs and claspers appear beside the gills. In two or three days more the eyes appear as distinct structures, and the gills become leaf-like. About the fourteenth day the embryo escapes from the egg and holds on to leaves of water-plants by means of its claspers. At this stage of its existence it resembles a fish in outward form and internal structure, and its whole anatomy may very easily be studied on account of its transparency. About twelve days after leaving the egg the fore-feet are longer, rudiments of toes are visible; the gills, at first simple, become fringe-like, and red blood circulates through them, and the claspers

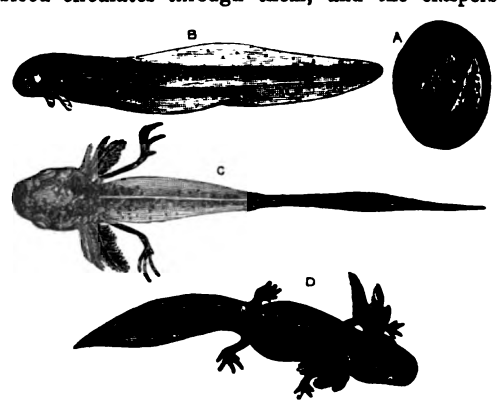

Fig. 2.—Larvæ of *Triton cristatus*.

A, condition before leaving the egg; B, tadpole shortly after it is hatched; C, at about the twenty-second day; D, at about the forty-second day.

disappear. About the twenty-second day it begins to breathe by means of its developing lungs; the gills are still large, and the hind-legs begin to sprout. This change takes place concurrently with the change of diet from vegetable to animal food. About the forty-second day after hatching, the gills begin to grow smaller and are soon obliterated. The newt then seeks to leave the water, respires atmospheric air only, and goes on to sexual maturity. In some circumstances individuals of this species occasionally retain some of the external appearances of immaturity in spite of having become capable of reproduction (a phenomenon more common, however, in a European species, *T. alpestris*, which may become sexually perfect even in its tadpole stage); and in rare instances they may bring forth their young alive as do the true salamanders. The Great Water Newt is seldom found on land. The Common Smooth Newt (*T. punctatus*), a smaller species about 3½ inches long, is much more common in Britain than the great newt, from which it also differs in having a smooth skin, the back crest continuous with the tail crest, and in being often found on land. Its eggs are laid in the axils of leaves quite as often as under the leaves. The Palmated Smooth Newt (*T. palmipes*) is the only other common British species. It has been found in various parts of Britain from the Isle of Wight to the north of Scotland. The toes of the hind-foot are webbed, the tail ends in a long filament, and the back crest is straight; these characteristics are prominent only in the breeding season.

Newts form very interesting inmates of aquaria, where they may be easily reared and kept; and their graceful movements and development interest the observer. The words *newt* and *eft* are really identical, *a newt* = *an ewt*, A.S. *efeta*, just as *an adder* resulted from *a nadder* by mistake.

Newton, (1) capital of Harvey county, Kansas, 134 miles by rail SW. of Topeka, is the centre of a rich coalfield. Pop. (1890) 5602.—(2) A city of Massachusetts, 7 miles WSW. of Boston by rail, and almost surrounded by the Charles River. It contains many suburban residences belonging to citizens of Boston, and has manufactures of cloth, silk, shoddy, machinery, glue, &c. Pop. (1860) 8382; (1890) 24,379.

Newton, Sir Isaac, the greatest of natural philosophers, was born on 25th December (o.s.) 1642—year remarkable in English history for the breaking out of the Civil War, and doubly remarkable in the history of science by the birth of Newton and the death of Galileo. The farm-house he was born in, still preserved religiously, is at the hamlet of Woolsthorpe in Cottersworth parish, Lincolnshire, 8 miles S. of Grantham (q.v.), at whose grammar-school the boy received his early education. On the 5th of June 1661 he left home for Cambridge, where he was admitted as subsizar at Trinity College. On the 8th of July following he matriculated as sizar of the same college. He immediately applied himself to the mathematical studies of the place, and within a very few years must have not only made himself master of most of the works of any value on such subjects then existing, but had also begun to make some progress in the methods for extending the science. In 1665, in which year he took his B.A., he committed to writing his first discovery on fluxions; and in 1666, according to Voltaire's *Lettres sur les Anglais* (1733), the fall of an apple, as he walked in the garden at Woolsthorpe, suggested the most magnificent of his subsequent discoveries—the law of universal gravitation. On his first attempt, however, by means of the law so suggested to his mind, to explain the lunar and planetary motions, he employed an estimate then in use of the radius of the earth which was so erroneous as to produce a discrepancy between the real force of gravity and that required by theory to explain the motions, corresponding to the respective figures 16·1 and 13·9.

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He accordingly abandoned the hypothesis for other studies. These other pursuits to which he thus betook himself consisted chiefly of investigations into the nature of light, and the construction of telescopes. By a variety of ingenious and interesting experiments upon sunlight refracted through a prism in a darkened apartment, he was led to the conclusion that rays of light which differ in colour differ also in refrangibility. This discovery enabled him to explain an imperfection of the telescope, which had not till then been accounted for. The indistinctness of the image formed by the object-glass was not necessarily due to any imperfection of its form, but to the fact of the different coloured rays of light being brought to a focus at different distances. He concluded rightly that it was impossible for an object-glass consisting of a single lens to produce a distinct image. He went further, and too hastily concluding, from a single experiment, that the dispersive power of different substances was proportional to their refractive power, he pronounced it impossible to produce a perfect image by a combination of lenses. This conclusion—since proved erroneous by the discovery of the achromatic telescope (see ACHROMATISM)—turned Newton's attention to the construction of reflecting telescopes; and the form devised by him is the one which, at later periods, reached such perfection in the hands of Sir William Herschel and Lord Rosse.

Newton became a Fellow of Trinity in 1667, and Lucasian professor of Mathematics in 1669; and it was on 11th January 1671 that he was elected a member of the Royal Society, having become known to that body from his reflecting telescopes. At what period he resumed his calculations about gravitation, employing the more correct measure of the earth obtained by Picard in 1670, does not clearly appear; but it was in the year 1684 that it became known to Halley that he was in possession of the whole theory and its demonstration. It was on the urgent solicitation of Halley that he was induced to commit to a systematic treatise these principles and their demonstrations. The principal results of his discoveries were set down in a treatise called *De Motu Corporum*, and were afterwards more completely unfolded in the great work entitled *Philosophiæ Naturalis Principia Mathematica*, which was finally published about midsummer 1687.

Shortly before the *Principia* was given to the public Newton had been called to take an active part in defending the rights of the university against the illegal encroachments of James II. The conspicuous part which he had taken on that occasion procured him a seat in the Convention Parliament, in which he sat from January 1689 to its dissolution in 1690. In 1696 he was appointed Warden of the Mint, and was afterwards promoted to the office of Master of the Mint in 1699, an office which he held till the end of his life. He again took a seat in parliament in the year 1701 as the representative of his university. Thus engaged in the public service, he had little time left for mere scientific studies—pursuits which he always held of secondary importance to the public duties in which he was engaged. In the interval of public duty, however, Newton showed that he still retained the scientific power by which his great discoveries had been made. This was shown in his solution of two celebrated problems proposed in June 1696 by John Bernouilli, as a challenge to the mathematicians of Europe. A similar mathematical feat is recorded of him so late as 1716, in solving a problem proposed by Leibnitz for the purpose, as he expressed it, [illegible] of feeling the pulse of the English analysts. When in parliament Newton recommended the publi[illegible] encouragement of the invention of a method for det[illegible]ermining the longitude—the first reward in consequence being gained by John Harrison for his chronometer. He was president of the Royal Society from 1703 till his death, a period of twenty-five years, being each year re-elected. In this position he could do much for the advancement of science; and one of his most important works during this time was the superintendence of the publication of Flamsteed's *Greenwich Observations*—a task, however, not accomplished without much controversy and some bitterness between himself and that astronomer. The controversy between Newton and Leibnitz as to priority of discovery of the differential calculus, or the method of fluxions, was raised rather through the partisanship of jealous friends than through the anxiety of the philosophers themselves, who were, however, induced to enter into and carry on the dispute with some degree of bitterness and mutual recrimination. The verdict of the impartial historian of science must be that the methods were invented quite independently, and that, although Newton was the first inventor, a greater debt is owing by later analysts to Leibnitz, on account of the superior facility and completeness of his method. In 1699 Newton was elected a foreign associate of the Academy of Sciences, and in 1703 he received the honour of knighthood from Queen Anne. He died at Kensington on 20th March 1727, and his remains received a resting-place in Westminster Abbey, where a monument was erected to his memory in 1731. Roubilliac's magnificent full-length statue was erected in 1755 in the ante-chapel of Trinity College, Cambridge.

Besides the first edition of the *Principia*, other editions appeared in 1713, 1726, 1729, 1730; and at Geneva the Jesuits' edition (1739–42; republished at Glasgow, 1822). An admirable reprint is that by Sir W. Thomson and Professor Blackburn (Glasgow, 1871). Clarke's Latin translation of the *Optics* appeared in 1706; the *Optical Lectures* in 1728; the *Fluxions* in 1736; and Horsley edited an edition of his collected works (5 vols. 4to 1779–85). Newton was a student of Alchemy (q.v.); and he left a remarkable monument of his interest in theology, especially prophecy, a MS. work on the prophecies of Daniel and on the Apocalypse, a history of the Creation, and a number of tracts. See the articles in this work on ASTRONOMY, FLUXIONS, GRAVITATION, LIGHT, MOTION (LAWS OF), OPTICS, SPECTRUM; Sir David Brewster's *Life of Newton* (1855); and Augustus de Morgan's *Newton, his Friend, and his Niece* (1885), that friend being John Conduitt (1688–1737), Newton's successor as master of the mint, who in 1717 married Newton's niece, Katherine Barton, the widow probably of the Earl of Halifax.

NEWTON'S RINGS.—In his investigations of the colours produced by thin plates of any material, solid, fluid, or gaseous, Sir Isaac Newton hit upon the following mode of exhibiting the colours produced by reflection from a film of air. He took two lenses, one convexo-plane, its convex side having a radius of 14 feet, the other equi-convex, with the radii of its surfaces 50 feet, and laid the first with its plane surface downwards on the top of the second, thus producing a thin film of air between the lenses; the film being thinnest near the centre, and becoming gradually thicker outwards. On slowly pressing the upper lens against the under one, a number of concentric coloured rings, having the point of contact of the lenses for their centre, appeared, and increased in size when the pressure was increased. These rings, or more properly systems of rings, are in this form of the experiment seven in number, and each of them is composed of a number (ranging from eight in the first or smallest ring to two in the outermost) of rings of different colours, the colours, though different in each of the systems of rings, preserving the same arrangement as the colours of the spectrum; thus, in the second ring the inside

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colour is violet, and the outside scarlet red. The colours are very distinct in the first three systems of rings, but become gradually confused and dull towards the outside, till they almost fade away in the seventh system. The centre is deep black. The thickness of the air-film at the centre is about half a millionth of an inch, and increases gradually to nearly $\frac{1}{1000}$ of an inch, when the colours disappear. See INTERFERENCE.

Newton, JOHN, the friend of Cowper, was born in London, 24th July (o.s.) 1725. He had little schooling, and, as his father was master of a trading ship, the boy joined him at eleven and sailed under him for six years. Next impressed on board a man-of-war, he was made midshipman, but was degraded and cruelly treated for an attempt to escape. He was allowed at Madeira to exchange into an African trader, joined a slaver at Sierra Leone, and sailed with her for two years, returning to England in 1747. He next sailed to Guinea and the West Indies as mate on a Liverpool slaver, married in 1750, and made several voyages of the same nature as master, giving his leisure to study. In 1755 he renounced his calling to become tide-surveyor at Liverpool. His religious opinions had already undergone an important change, which led him to apply in 1758 to the Archbishop of York for holy orders, but without success. In 1764 he was offered the curacy of Olney, and he was at once ordained deacon, and next year priest, by the Bishop of Lincoln. Hither the poet Cowper came about four years later, and an extraordinary friendship quickly sprang up between the two men. Newton was a burning Calvinist, and it cannot be doubted that the converted slaver's influence was to a great extent disadvantageous to the sensitive nature of the poet. Newton left Olney in 1779 to become rector of St Mary Woolnoth, London, and here he died, December 31, 1807. Newton's prose-works, *Omicron* (1762), *Cardiphonia* (1781), &c., are now but little read, save his vigorous and interesting *Authentic Narrative of some Interesting and Remarkable Particulars in his own Life.* But his name can never be forgotten from its association with Cowper, and from some of his *Olney Hymns*, which have been taken to the heart by the English-speaking religious world. Of these need only be named here: 'Approach, my soul, the mercy-seat;' 'How sweet the name of Jesus sounds;' 'One there is, above all others;' and 'Quiet, Lord, my froward heart.'

See the Life by Richard Cecil (1808), prefixed to a collected edition of Newton's works (6 vols. 1816); Thomas Wright, *The Town of Cowper* (1886); and other works cited at COWPER.

Newton, THOMAS, was born at Lichfield, January 1, 1704. From Westminster he passed to Trinity College, Cambridge, became one of its fellows, took orders, and after minor preferments was made Bishop of Bristol and Canon Residentiary of St Paul's in 1761. He died 14th February 1782. Newton's annotated edition of Milton's *Paradise Lost* and *Paradise Regained*, and his *Dissertations on the Prophecies* (3 vols. 1754–58) long enjoyed a reputation far beyond their deserts.

Newton-Abbot, a market-town of Devonshire, at the influx of the Lemon to the Teign estuary, 15 miles (by rail 20) S. of Exeter. Ford House, a good Tudor building, has lodged both Charles I. and William of Orange, who here in 1688 was first proclaimed king. Pop. (1851) 3147; (1881) 9826.

Newton Heath, a town and local government district, and part of the parliamentary borough of Manchester, with a pop. of 29,189.

Newton-in-Makerfield (otherwise NEWTON-LE-WILLOWS), with its suburb of Earlstown, a thriving town of Lancashire, 16 miles E. of Liverpool and 16 W. of Manchester. An important railway junction, it has rapidly increased in size, and large printing-works, paper-mills, iron-foundries, and a sugar-refinery are here in operation, whilst numbers of hands are employed in the making of bricks and railway wagons. Near to the town is a fine racecourse on which a meeting is held annually in July. At Parkside, ½ mile distant, the Right Hon. W. Huskisson met with the accident which caused his death, on the occasion (15th September 1830) of the opening of the railway. Newton returned two members to parliament from 1558 to 1832, when it was disfranchised. Pop. (1801) 1455; (1881) 10,580; (1891) 12,861.

Newton-Stewart, one of the most beautifully situated among the smaller towns of Scotland, on the Wigtownshire side of the river Cree, near its mouth, by rail 50 miles W. of Dumfries and 24 E. of Stranraer. It owes its name to a son of the Earl of Galloway, who obtained a charter making it a burgh of barony in 1677. Manufacturing enterprises have hitherto proved unsuccessful. Its buildings are a fine town-hall (1884) and an endowed school, the Ewart Institute (1864). Pop. (1841) 2432; (1881) 3070; (1891) 2332.

Newtown (Welsh *Drefnewydd*; anc. *Llanfair Cedewain*), a manufacturing town of Montgomeryshire, North Wales, on the Severn and the Montgomery Canal, 13 miles SSW. of Welshpool. It is the centre of the Welsh flannel manufacture, and also produces tweeds, shawls, &c. With Montgomery, &c., it returns one member. Robert Owen was a native. Pop. (1851) 6371; (1891) 6610.

Newtownards, a town of County Down, 14 miles E. of Belfast by rail. Flax-spinning, muslin-weaving and embroidering, and nursery-gardening are the industries, and there are important markets. Pop. (1881) 8676.

New Westminster, formerly the capital of British Columbia, is on the north bank of the Fraser River, 10 miles from its mouth and 113 miles by rail and steamer NNE. of the present capital, Victoria, on Vancouver Island. Here are a penitentiary and a lunatic asylum, sawmills, and great salmon-canning establishments. Pop. 2700.

New-year's Day, the first day of the year. The custom of celebrating by some religious observance, generally accompanied by festive rejoicing, the first day of the year, appears to have prevailed among most of the ancient nations. The Jews, the Egyptians, the Chinese, the Romans, and the Mohammedans, although differing as to the time from which they reckoned the commencement of the year (see CALENDAR, CHRONOLOGY, YEAR), all regarded it as a day of special interest. On the establishment of Christianity the usage of a solemn inauguration of the New Year was retained; but considerable variety prevailed, both as to the time and as to the manner of its celebration. Christmas Day, the Annunciation (25th March), Easter Day, and 1st March have all, at different times or places, shared with the 1st of January the honour of opening the New Year; nor was it till late in the 16th century that the 1st of January was universally accepted as the first day of the New Year. The early Fathers—Chrysostom, Ambrose, Augustine, Peter Chrysologus, and others—in reprobation of the immoral and superstitious observances of the pagan festival, prohibited in Christian use all festive celebration; and, on the contrary, directed that the Christian year should be opened with a day of prayer, fasting, and humiliation. The festal character of the day, however, generally was preserved, though the day was also observed as a day of prayer.

From the earliest recorded celebration, we find notice of feasting and the interchange of presents

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as usages of New-year's Day. Suetonius alludes to the bringing of presents to the capital; and Tacitus makes a similar reference to the practice of giving and receiving New-year's gifts. This custom was continued by the Christian kingdoms into which the western empire was divided. In England we find many examples of it, even as a part of the public expenditure of the court, so far down as the reign of Charles II.; and, as all our antiquarian writers mention, the custom of interchanging presents was common in all classes of society. In England, as in Germany, this custom has been largely eclipsed by the still more popular practice of Christmas gifts (see CHRISTMAS); in Scotland, as in France and Italy, New-year's Day is still the day most observed, and the festival according to Old Style, twelve days later, still lingers in corners of the country. In some parts of the United States and Canada gentlemen are exceptionally industrious in making social calls on the first day of the year. In many countries the night of New-year's Eve, 'St Sylvester's Eve,' was celebrated with great festivity, which was prolonged till after twelve o'clock, when the New Year was ushered in with congratulations, complimentary visits, and mutual wishes for a happy New Year; this is an ancient Scottish custom (see HOGMANAY). In many places the practice of tolling bells till midnight, and then 'ringing in the New Year,' is still observed. Many religious communions are wont to celebrate it with a special service or 'watch night.' In the Roman Catholic Church New-year's Day is a holiday of strict obligation. See Chambers's *Book of Days*.

New York, the 'empire state' of the American Union, is the twenty-fifth in area and the first in population. It lies between 45° and 40° 29′ 40″ N. lat., and (including Long Island) between 71° 51′ and 79° 47′ 25″ W. long. It is somewhat triangular in shape, and has a very irregular outline. Its boundary line measures 1420 miles, of which 879 miles, or nearly two-thirds of the entire length, lie along the shores of Lake Erie, the Niagara River, Lake Ontario, the St Lawrence River, and Lake Champlain. The remaining portions of the boundary are formed by arbitrary straight lines. Area, 49,170 sq. m., or almost that of England. Long Island is the largest, and Manhattan, containing the most populous part of New York City, the most important of the many islands.

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The surface structure of New York is remarkably diversified, and presents many contrasts of elevation. The state is traversed by numerous chains of mountains and hills, among which lie beautiful valleys. There is also much rolling land, and there are several extensive plains. The greatest elevations are in the eastern and north-eastern parts of the state, but nearly the whole of the south-eastern part is hilly or mountainous. From this highland region the land slopes gradually, and declines in a series of terraces, north and west toward Lake Ontario. The most level portions are those bordering that lake and the St Lawrence River. The mountainous region in the east is cut by the gap of the Mohawk River. The narrow valley of this stream, once traversed by a mighty river which drained the great Ontario basin, joins at right angles the deep depression in which are Lake Champlain, Lake George, and the Hudson River. Both of these valleys pass directly through the Appalachian system of mountains, and divide the state into three distinct sections. The mountains are also disposed in three groups. The Adirondacks (highest point, Mount Marcy, 5400 feet), in the north-eastern part of the state, are completely isolated by the valleys of Lake Champlain and the Mohawk River from all other parts of the Appalachian system. South of the Mohawk valley are the Catskills with various associated groups, such as the Helderberg and the Shawangunk Mountains, covering an area of about 500 sq. m. The Shawangunk Mountains are continuous with the Blue or Kittatinny Mountains of Pennsylvania. The Taconic range of New England enters the state still farther south, and passes south-westerly into New Jersey. This range is cut by the Hudson River, and forms the celebrated Highlands.

The geology of New York is peculiarly interesting and comprehensive. With the exception of the Jurassic formations and a few others closely related in time with the Jura-Trias, its rocks exhibit deposits of nearly every period, from the primitive Archæan rocks to the Tertiary and recent alluvium. Briefly and superficially classified, the outcropping rocks are disposed as follows: In the north-eastern part of the state, with the Adirondacks as a centre, is a somewhat circular area of Archæan formation. Along the eastern side of the Hudson River and near its mouth, the Archæan rocks again appear, and are continuous with the primitive formations of New England. Nearly surrounding the Adirondack region is a belt of Silurian rocks, which extends southward along the western shore of the Hudson, and westward, bordering upon Lake Ontario and Lake Erie. North of the Adirondacks is a belt of Cambrian rocks, and south and west of the Silurian belt the greater part of the formation belongs to the Devonian age, with traces of Carboniferous deposits, but no true coal-measures. There are in the state some extensive iron-mines, deposits of lead, copper, zinc, and other valuable minerals, and an abundance of building-stones. The salt-springs, especially those of the Onondaga salt group, are of great value. There are also valuable petroleum springs, and mineral and medicinal springs—the most noted are those at Saratoga, Ballston, Sharon, Richfield, Avon, and New Lebanon.

The most important river belonging entirely to the state is the Hudson (q.v.). The Oswego, draining a chain of lakes in the central part of the state, the Black, and the Genesee are affluents of Lake Ontario; the St Lawrence forms part of the northern boundary; the Niagara connects Lakes Erie and Ontario, and the Delaware, the Susquehanna, and the Allegany rise within and drain the southern portions of the state.

New York lies mainly in the lake region of North America. The eastern part of Lake Erie, one-half of Lake Ontario, and one-half of Lake Champlain are controlled by the state. Among the numerous lakes of north-eastern New York, Lake George and the Adirondack lakes are the most noted. There are three groups of picturesque lakes in central New York. The mountains, rivers, and lakes of New York make it famous for its scenery. Of this, one of the most notable features is the number of waterfalls, among which the mighty Niagara is of course pre-eminent. Other beautiful falls are the Falls of the Genesee (q.v.), Trenton Falls, the Kaaterskill Falls in the Catskills, and those of Cohoes, Ticonderoga, and at Watkin's Glen.

The average temperature of New York is about 47° F., with a range of over 100°. The climate is thus subject to extremes, but is very healthful. Although the surface is so diversified, most of the soil is arable, and much of it is fertile. More than one-half the area of the state is under cultivation. The usual farm products are raised in abundance. In the lake valleys there are many vineyards. Hops and tobacco are also important crops. In the vicinity of New York and the other large cities market-gardening is a profitable occupation, and the highland regions yield excellent milk, butter, and cheese. But manufacturing is the leading

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industry, and in the value of its manufactured products New York is the foremost state of the Union. Moreover, its geographical position and its natural avenues of communication with other parts of the country, together with the system of canals and railroads, make it the leading commercial state. There are several canals, of which the Erie (see CANAL) is the most important. New York is the centre towards which nearly all the great railroads of the country tend, and within the state there are nearly 7800 miles of railway.

Previous to the coming of the whites the territory now known as New York was occupied by the Iroquois (q.v.) Indians. Almost simultaneously, in 1609, Samuel Champlain discovered the lake which bears his name, and Henry Hudson explored the Hudson River as far as the present site of Albany. A few years later settlements were made by the Dutch, but they were looked upon as intruders by the English, who in 1664 forced them to surrender their city of New Amsterdam, which had grown up on Manhattan Island. The name was then changed to New York, and, with the exception of a short period in 1673, the city remained in the possession of the English till the war of the revolution. As in the other colonies, the early settlers endured many vicissitudes, and were at different times engaged in conflicts with the Indians. In the struggle for independence, in the war of 1812, and in the civil war New York played a prominent part. The physical structure of the state has made it a most important factor in the development of the nation, and in population, wealth, and political influence it has always held the pre-eminence.

With her great material prosperity New York has not neglected the education of her people. There is no more complete school-system in the country. It includes more than 11,000 school districts. There are eight normal schools in the state, and the normal college at New York City, beside many private schools and academies; and there are nearly thirty colleges, universities, and schools of higher learning, not including theological seminaries and professional schools.

Politically the state is divided into sixty counties; it returns the largest number (34) of members to congress. No other state has so many large cities and thriving, enterprising towns. New York City is the centre of a thickly populated district, which is second only to London in the number of its people and the importance of its commercial interests. The other most important cities are Albany (the capital), Brooklyn, Buffalo, Rochester, Troy, Syracuse, Utica, Oswego, Kingston, Elmira, Poughkeepsie, Auburn, Cohoes, Newburgh, Yonkers, Long Island City, Binghamton, Schenectady, Lockport, Rome, Ogdensburg, Watertown, Hudson, and Dunkirk. Pop. (1800) 589,051; (1850) 3,097,394; (1880) 5,082,871; (1890) 5,997,853.

New York City, the largest and most important city on the American continent, and the third wealthiest on the globe, is situated on the east side of Hudson (here called North) River, at its confluence with the East River (q.v.), which opens into Long Island Sound. It lies in the state of New York, in a straight line 8½ miles, and by the waterway about 12 miles from the ocean, in 40° 42′ 43″ N. lat., and 74° 0′ 3″ W. long. It comprises the island

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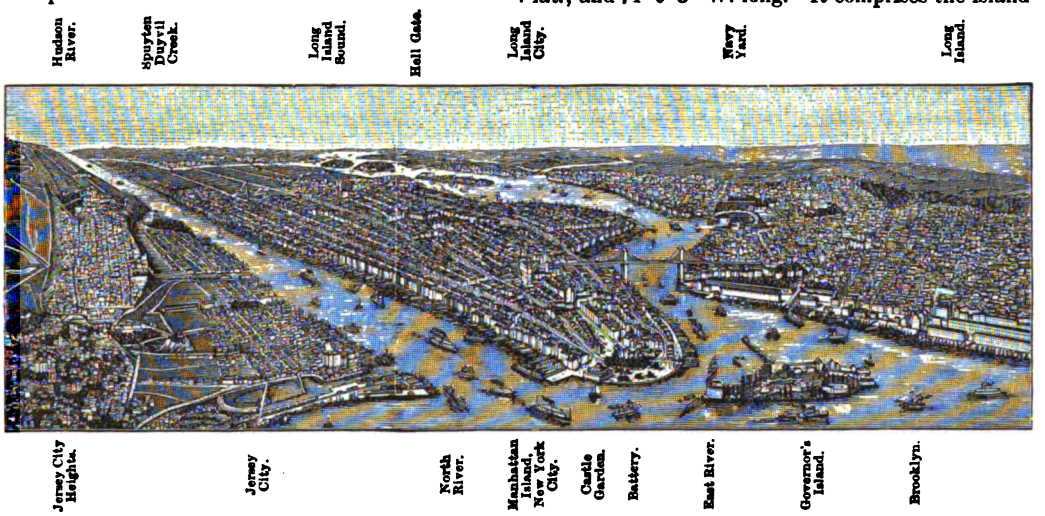

of Manhattan, formed by the two rivers, which is separated from the mainland by a narrow strait, the east portion of which is known as Harlem River, and the west as Spuyten Duyvil Creek. It also includes several small islands in the inner bay and East River. In 1873 the city's limits were extended so as to embrace 12,100 acres on the mainland, lying toward the east and north, in Westchester county, as far as the city of Yonkers. The total area of New York City now embraces 41½ sq. m. Manhattan Island is 13½ miles long, with an average breadth of 1¾ mile. A rocky ridge runs through the upper part of its western side, rising to 238 feet, known as Washington Heights. With the exception of a small portion of wild and stony space, which is being utilised for ornamental purposes, the entire island is laid out in avenues and streets, lined with houses; its area includes several greens and parks. The lower part of the city has to a considerable extent been extended by filling in on the two river-sides.

The bar at Sandy Hook, 18 miles south of the city, which divides the Atlantic Ocean from the outer bay, is crossed by two ship-channels, from 21 to 32 feet deep at ebb-tide. The lower bay covers 88 sq. m. for anchorage. In it are buildings for quarantine and hospital purposes, and an anchored floating hospital-ship, in charge of a health-officer. The Narrows, through which all large ships pass on their way to the inner harbour, is a strait between Long Island and Staten Island, about a mile in width, 8 miles distant from the city, in a south-easterly direction. This approach is defended by Forts Wadsworth, Tompkins, and Hamilton. There is also another channel leading

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from the sea, through the so-called Kills, around Staten Island, between it and the New Jersey shore; only vessels of light draught can approach by this route. Vessels that come from the north and east, by way of Long Island Sound, pass the fortifications at Throgg's Neck on the mainland and Willett's Point on Long Island, about 10 miles from the city; their nearer approach is hindered by the rocky shoals and intricacies at Hell Gate (see BLASTING). New York's harbour or inner bay covers about 14 sq. m.; it is one of the amplest, safest, and most picturesque on the globe, open all the year round; many waterways place it in easy communication with the interior. Bridges span the East River and Harlem River, and about thirty steam-ferries are in constant intercourse with the neighbouring shores. The island of Manhattan has nearly 25 miles of water-frontage, of which 13 miles are on the Hudson River side; a large, unimproved part of the shore remains for future extension. The city is the centre of finance and commerce of the United States. It receives 66 per cent. of all the imports, and sends abroad 44 per cent. of the exports. Over 4000 steamers and 4000 sailing-vessels enter and clear in the coastwise trade, and 2150 steamers and 5000 sailing-vessels in the foreign trade. The annual exports of merchandise in 1890 amounted to about $400,000,000, the imports to over $500,000,000. There are more than seventy wooden piers on each river; and for want of convenient wharf accommodation several lines of foreign steamers have transferred their piers to the shores of Brooklyn and New Jersey, while a large amount of staple produce from the southern states and from distant lands is housed on the wharves and in the large storehouses of Brooklyn. Liberty Island, for a long time known as Bedloe's Island, is situated in the harbour, about 1½ mile from the lower end of the city. In 1886 the famous Bartholdi (q.v.) statue was erected on this spot, and occupies its central surface. The New York and Brooklyn Suspension Bridge (see BROOKLYN) spans the East River from opposite the old City Hall Park.

Old New York is laid out very irregularly. Here the money interests and wholesale traffic are centred. Wall, New, and Broad streets are the great centres in which banking and speculative enterprises are conducted to an enormous extent. The first-named thoroughfare is hardly half a mile in length, but in extent of business is perhaps unequalled by any other locality on the globe. The newer part of the city, from 14th Street to the end of the island, northward, is divided into twelve great avenues and several smaller ones, from 75 to 150 feet in width, running north and south. These are crossed at right angles by streets, mostly 60 feet in width, running from river to river. Fifth Avenue, the great modern central thoroughfare, divides the city into eastside and westside. Twenty street blocks measure a mile; every tenth street is double the usual width, designed for business purposes. Among old inhabitants remote parts of the city still bear the names of former village sites. The original great thoroughfare, Broadway, runs a distinct, devious course through the regular street arrangement, making several short angles and turns through the middle of the island. On reaching 59th Street it resolves itself into a grand boulevard. The streets, in general, are substantially paved, and at night well lighted by gas and electric lights. Many, however, are suffered to remain in an unswept and neglected condition. In the lower part of the city obstructions are often permitted permanently to occupy the sidewalks, and pedestrians are compelled, among carts and horses, to explore their way through the middle of the street.

Night and day sumptuous passenger steamers pass up and down Hudson River, Long Island Sound, and beyond the Narrows, down to the lower bay. Lines of railroads radiate from the Grand Central Depôt; others run from the opposite shores of New Jersey and Brooklyn. The large city depôt is 695 feet long and 240 wide; about 125 trains arrive and depart daily. Several of the city's avenues are traversed their full length by elevated steam passenger-railroads, built on wrought-iron structures, which from early dawn to midnight carry crowds of local passengers. Besides these there are many lines of horse and cable tramways, and a few worked by electric agency. Already these modes of conveyance are so overtaxed that additional travelling facilities are urgently demanded. More river-bridges, a viaduct avenue, subterranean roadways, and tunnelling under the rivers are in active contemplation; for most of these enterprises charters have already been granted. The number of houses is estimated at above 120,000, mostly built of red brick, the better class of brown sandstone, a few of wood. Besides these there are stores built of iron, brown and yellow sandstone, and a few of marble; little granite is being used in modern structures. The construction of wooden buildings in the lower part of the city has been interdicted. The modern tendency is to build roomy, tall, fireproof and semi-fireproof structures for apartment-houses and for business purposes, the internal ascents of which are made, from story to story, by mechanical elevators. Most of these structures range from 75 to 100 feet in height, and are costly and elegant. Among prominent public edifices are noteworthy: the City Hall, County Court-house, Custom-house, Treasury Building, Tombs (prison), Barge Office, Masonic Temple, Academy of Design, Cooper Union, Post-office, Produce Exchange, Madison Square Garden Hall, University of the City of New York, Lenox Library, Temple Emanuel, Trinity Church, and the Roman Catholic cathedral, besides numerous large, imposing hotels and palatial dwellings and business depôts. In many cases vaulted basements and sub-cellars are laid out under the buildings and sidewalks on an extensive scale. Among the apartment-houses conspicuous for size and luxurious appointments are Navarro's Spanish Flats, the Dakota, Gerlach, Knickerbocker, Florence, and Central Park structures. In out-of-the-way side streets the dependent and poorer classes are huddled together in equally tall, brick-built, dirty, yardless tenement houses. Immense retail bazaars and arcades are found on Broadway, Grand Street, 14th, 23d, and 125th Streets, and 3d, 6th, and 8th Avenues.

The city government is under a mayor and board of aldermen; these offices are mostly filled by adopted citizens from Ireland and Germany, who form a large part of the city's voting elements. The police force numbers 3420 men; there are thirty-five station-houses, where prisoners are temporarily conveyed, and shelter is provided for the homeless at night. New York has a paid fire-department, conducted at an annual expense of $2,000,000, and divided into 76 companies; 1039 well-trained men and 337 horses are employed. Its appointments include, among others, 89 steam fire-engines, 15 trucks, and 84 telegraph stations. The lighting of the city is mostly done with gas, although electric lighting is gradually being brought into use. Of public gas-lamps there are some 25,000. Four gas companies are in operation, and have together about 900 miles of mains laid under ground. The Croton Aqueduct conveys to the city an ample supply of soft water from the Croton River and its lakes, a distance of about 40 miles, to the four reservoirs of the city (see AQUEDUCT).

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In Central Park the retaining reservoir holds 1,030,000,000 gallons, the receiving reservoir 150,000,000 gallons, the distributing reservoir on 5th Avenue 20,000,000 gallons; at High Bridge there is also a high-service reservoir, with a capacity of 11,000,000 gallons. The iron main-pipes are little short of 500 miles in length. Electric telegraphs and telephones are largely in use. The New York General Post-office building, erected of granite, at a cost of $6,500,000, was first occupied in 1875. It is situated in what was formerly known as the City Hall Park, in the lower part of the city. More than 2500 persons are here employed. There are 18 stations and 20 sub-stations in various parts of the city, and 1600 lamp-post boxes. A federal commissioner now receives and attends to the wants of immigrants. In some years the immigration by way of New York has risen to nearly half a million.

The Battery Green encloses twenty-one acres, planted with trees, shrubbery, and grass, and occupies the most southern point of Manhattan Island; it marks the original site of Nieu Amsterdam. After the American revolution it was used for military and civic displays, and from that time until near the middle of the 19th century was the fashionable promenade. On its west side is Castle Garden (q.v.). The grading of Central Park was begun in 1857. It is laid out in the highest style of art, containing walks, drives, and bridle-paths, and is decorated with artificial lakelets, fountains, bridges, monuments, statues, recreative and garden structures. It also holds the Egyptian obelisk, brought from Alexandria in 1880. Within the park confines, besides the reservoirs, are the Museum of Art and buildings for a zoological collection, while 'annex' grounds contain the Museum of Natural History. Central Park comprises 843 acres, extends from 59th to 110th Street, and is bounded by 5th and 8th Avenues; its dimensions are thus 2½ miles by ¾ mile. Riverside Park is a narrow, irregular strip of land, running alongside the Hudson from 72d to 130th Street, much used for riding and driving purposes. On the newly-acquired mainland two extensive parks have been laid out—Jerome and Van Cortlandt—the first named being used as a racecourse.

New York has 97 local fire-insurance companies, 10 local marine-insurance companies, 39 local life-insurance companies, 83 commercial banks (of which several have a capital of $5,000,000), 23 savings-banks, and 15 trust-companies. About 288 newspapers (daily, weekly, and monthly) are published—some of them are in foreign languages; the prominent journals occupy immense buildings. Dispensaries, hospitals, and charitable institutions are numerous. Homes for the aged and crippled, the insane, idiots, blind, deaf and dumb, magdalens, and foundlings are provided. Of church buildings there are about 400—91 Episcopal, 88 Methodist, 84 Presbyterian, 59 Roman Catholic, 54 Baptist, and 29 Jewish. There are congregations of Christian Israelites, Swedenborgians, Salvation Armyists, Spiritualists, Negroes, and Chinese. Of the public schools 47 are primary and 85 grammar-schools, each jointly under a male and female principal. Many children of Roman Catholic parents are being withheld from these institutions, in favour of parish schools of their own denomination. The day attendance at public schools averages 307,000; at evening schools about 20,000. There are three general colleges—Columbia, the University of the City of New York, the College of the City of New York, and the Normal College, belonging to the public-school system. Besides these there are many special colleges and academies, Union Theological Seminary (Presbyterian), the Protestant Episcopal General Theological Seminary, &c. Among libraries may be named the Astor, with 240,000 volumes; Mercantile, 207,000; Columbia College, 105,000; Apprentices', 84,000; Historical Society, 72,000; and Society, 70,000. Besides these there are a number of free circulating libraries. The Museum of Art, Museum of Natural History, and Lenox Gallery are free to the public. Annual exhibitions of paintings and statuary are held at the Academy of Design and other places, and of mechanical inventions at the hall of the American Institute. The theatres number 24, besides an opera-house and numerous concert-halls. Among the wealthy club life is rapidly on the increase; in a few instances it extends to the gathering of women. Noted clubs are the Manhattan, Union, New York, St Nicholas, Knickerbocker, Union League, University, Lotus, Harmonic, and Century. Of musical clubs and singing societies there are many, mostly under German leadership and patronage. Prominent are the Liederkranz, with 1600 members, and Arion, with 800 members. The principal orchestral society is the Philharmonic.

John Verrazani, a Florentine navigator, was the first European who entered New York bay, in 1525. His exploration was interrupted by a storm that compelled him to put to sea without making a settlement. In 1609 Henry Hudson entered Hudson River, and, trading with the aborigines, ascended the stream for about a hundred miles. In 1614 the Dutch built a fort on Manhattan Island, and in 1623 a permanent settlement was made, named Nieu Amsterdam. In 1674 Manhattan Island came into the possession of Great Britain, who gave it the name New York, in honour of James, Duke of York. At the time of the American Revolution the city's population was less than that of Philadelphia and Boston. It was evacuated by the forces of Great Britain in 1783, and from 1785 to 1789 was the seat of government of the United States. In 1774 the city census, taken by government, showed a population of 22,861; (1800) 60,489; (1825) 166,136; (1850) 550,394; (1860) 813,669; (1870) 942,292; (1880) 1,206,599; (1890) 1,515,301. A recounting was made by the city police in the last-named year, under the direction of the mayor, in which the returns amounted to 1,710,715 persons. Should we add the populations of several adjacent cities that bear a suburban relation to the great metropolis, the busy hive would count no less than three million people. See Histories by Lossing (2 vols. 1885) and by Roosevelt (1891).

New Zealand, a British colony in the South Pacific Ocean, comprises three main islands—named the North Island, the South or Middle Island, and Stewart Island, the last being much the smallest—besides a number of islets near the coast. The North and South Islands are long and narrow, so that no place is more than 75 miles from the coast. Their position relative to Australia is much the same as that of Turkey to England, as they lie 1200 miles more to the east and stretch 600 miles farther south. The main islands have a length of 1100 miles, and lie between 34° 22′ and 47° 18′ S. lat. and 166° 27′ and 178° 34′ E. long. Projected on the map of Europe, these latitudes would begin in central France and end in the north of Africa. The total area of the colony is 106,240 sq. m., or about one-eighth less than that of Great Britain and Ireland. Cook Strait, a deep and somewhat stormy passage of 13 miles at the narrowest part, separates the North and South Islands. Foveaux Strait, about 15 miles in width, divides the South Island from Stewart Island.

Coast Features.—In its northern half the North Island is deeply indented by the sea, and contains many excellent harbours; the southern half has but one harbour, that of Wellington or Port Nicholson in the south-west corner. The coast of the South

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Island is little broken except in the north-east and south-west corners, where the country is mountainous; but the volcanic projections of Banks and Otago peninsulas supply commodious harbours, which have been greatly improved by moles and dredging. The ports carrying on the great import and export trade of the colony are Auckland, Napier, and Wellington in the North Island, and Lyttelton, Dunedin (Port Chalmers), and Bluff Harbour in the South Island. Coasting steamers call at numerous minor ports, the chief being, in the North Island, the Bay of Islands, Tauranga, Gisborne, Foxton, Wanganui, New Plymouth, Manukau, and Kaipara; and in the South Island, Nelson, Picton, Akaroa, Timaru, Oamaru, Hokitika, Greymouth, and Westport. The harbours of Timaru and Oamaru consist of spacious basins enclosed by massive concrete moles. Those at Greymouth and Westport have been constructed at great expense at the mouths of the rivers Grey and Buller to facilitate the shipping of the excellent coal found in vast quantities in the neighbouring hills. Large sums have been spent in improving the harbours of the colony.

Surface.—New Zealand is composed of rocks of all geological ages, and the chief mountain-chains are of great antiquity. A third of the North Island is covered by recent volcanic rocks and their debris. Both islands are mountainous, but this is especially true of the South Island. Each is traversed by a great mountain-chain running in a north-east and south-west direction, which practically divides them into an eastern and a western side, between which traffic is mainly carried on by sea. In the North Island the east and west sides are connected by two railways, one of them passing through the beautiful Manawatu Gorge, and also by a coach-road passing over the ranges west of Hawke Bay. Resting on the main chain of the North Island on its west side lies a vast triangular plateau, the eastern border of which constitutes the volcanic belt of New Zealand. On this stand up two extinct volcanoes—the majestic cone of Mount Egmont, near the west coast, and the massive Ruapehu (9195 feet) in the centre, with the active cone of Tongariro hard by. The latter still gives off steam and smoke, but has not ejected lava in historic times. In this plateau the chief rivers of the North Island take their rise. The Waikato, the largest and longest, passes through the beautiful Lake Taupo, and at length flows out on the west coast. A few of the rivers are navigable for small vessels in their lower course. The North Island contains many extensive plains of low elevation and remarkable fertility, besides large areas of fern-clad or grassy hills well fitted for occupation. The favourable climate renders even the upland plateaus capable of close settlement. The better lands of the South Island are now mostly taken up, though far from closely settled, but in the North Island there remain vast tracts of excellent land waiting to be cleared and occupied. Much of it belongs to the natives, who are no longer reluctant to sell their lands at a fair price. Two-thirds of the South Island is covered by the broad and lofty chain of the Southern Alps, and its eastern and southern offshoots. It culminates in Mount Cook, towering to a height of 12,349 feet amid many other snow-clad peaks, and mantled by glaciers of greater magnitude than any in the Alps of Europe. This elevated region is penetrated by the great valleys of the numerous rivers flowing away to the east and south. These have all a rapid fall, are liable to sudden floods, and being snow-fed have a much larger volume in summer than in winter. Their valleys sometimes open out into extensive upland plains having a hot, dry summer, and a sharp but bright winter. The principal rivers are the Buller, Waimakariri, Waitaki, Clutha, and Waiau. The chief lowlands of the South Island lie to the east and south of the main chain. The vast Canterbury plains, in many parts of great fertility, skirt the east coast, and the Southlands plain, equally extensive, lies between the mountains of Otago and the south coast. Much of the east and south-east seaboard and interior is occupied by fertile downs and low hills. The west coast consists of a narrow belt of low land clothed with impenetrable forest, save where miners and farming settlers have made clearings, and where the broad river-beds come down to the sea. A coach-road passes over the main chain at a height of 3000 feet, connecting Canterbury and Westland, and a railway was in 1890 in course of construction along the same picturesque but difficult route. In the North Island much of the finest land is covered by forests of tropical luxuriance, which ascend the mountains to a height of 4000 feet, but the greater part of the South Island is very scantily supplied with timber, and mountains and lowlands alike are open and well grassed, yielding good pasture even in their natural condition. The great peninsula north of Manukau Harbour differs from the rest of New Zealand in enjoying a humid semi-tropical climate. Much of this region is admirably fitted for cottage husbandry, and the fruits of the warmer latitudes grow in great abundance and perfection. Settlers can here live like the peasantry of Spain and Italy, growing flowers for perfumes, maize, figs, olives, grapes, oranges, lemons, mulberries, and other tender fruits. This district is the home of the noble kauri pine, and supplies most of the kauri gum brought to the market. The numerous inlets and the large Wairoa River give ready access to the best of the land.

Climate.—The climate of New Zealand is one of the best and healthiest in the world. The rate of mortality has been decreasing for a number of years, and is now as low as 9·04 per thousand. Diseases from malaria are unknown. Owing to the great length of the islands the climate presents considerable variety, and the direction of the mountain-chains increases the difference due to latitude alone. The average temperature is remarkably equable at all seasons, and the air is singularly fresh, being constantly agitated by winds that blow over a boundless expanse of ocean. The climate is such as Italy would have if it were 1000 miles from the nearest continent. The average daily range of temperature is 20°. The average annual temperature of the North Island is 7°, and of the South Island 4°, higher than that of London. Near the western seaboard the climate is more equable and much moister than on the long eastern and northern slopes. More rain falls than in England, and the weather is generally more changeable, but there are fewer wet days. The country is everywhere well watered, and prolonged droughts are unknown. Snow seldom falls even in the southern lowlands, and it usually melts in a day. The mildness of the winter allows cattle and horses to remain in the fields without shelter, and even in the south dairy cows are housed at night only for a few months. The prevailing winds blow from the south-west and are often chilly and boisterous. Other winds are light, with fine weather; but fierce gales are often experienced near Cook Strait and along the eastern edge of the plateau-like offshoots of the Southern Alps.

Scenery.—For variety, picturesqueness, and wild grandeur, the scenery of New Zealand is unrivalled in the southern hemisphere, and the colony is rapidly becoming to Australia and the far East what Switzerland is to Europe. In the North Island is the wonderland of the volcanic belt,

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remarkable for its hot lakes and pools, which possess great curative virtue for all rheumatic and skin diseases, its boiling geysers, steaming fumaroles, sulphur-basins, and pumice plains. These and other interesting phenomena are scattered broadcast over a wide belt, stretching from the extinct Ruapehu to the active volcano of White Island in the Bay of Plenty. The exquisite siliceous terraces of Rotomahana, once the cynosure of the island, are now buried beneath the debris of Mount Tarawera, shattered to dust by the gigantic steam explosion of June 1886. This region shows better perhaps than any other quarter of the globe the senile and expiring efforts of a prolonged cycle of volcanic activity, and every part of it can be explored without hardship and in perfect security. A well-appointed sanatorium is carried on at Rotorua by the government for the healing of the people of the Australian colonies, and is much frequented. Earth tremors and slight earthquakes are not uncommon in the neighbourhood of Cook Strait, but they have done less harm since the colony was settled than earthquakes have done in England during the same period. In the South Island the Central Alps of the Mount Cook district display to the visitor the grandest glaciers in the temperate zones, splendid clusters of snowy mountain-peaks, and stupendous valleys set off by a series of placid yellow-tinted lakes. Farther south the Otago lakes—Wanaka, Wakatipu, Te Anau, and Manipori, embosomed in mountains 5000 to 8000 feet high—present some of the finest lake and mountain scenery in the world, and prove an unfailing source of delight to sightseers from every land. The south-west coast of Otago is pierced by a series of deep and tranquil sounds of exquisite beauty, charming the beholder now with their picturesque variety, and anon with their precipitous grandeur and impressive quietness and gloom. Milford Sound, near which are the famous Sutherland Falls, 1904 feet in height, is justly reckoned one of the finest sights the world has to show.

Fauna and Flora.—New Zealand is a group of true oceanic islands, having been severed from all adjoining lands for countless ages. Originally it contained no mammals except two species of bat. The next highest animals were a few small and harmless lizards, the largest being the remarkable 'tuatara,' famous for its median pineal eye hidden under the skin of the head. Among the birds are several parrots, one of which—the mountain Kea (q.v.)—has recently acquired the habit of killing sheep by pecking the flesh of the loins, and several wingless kiwis (see APTERYX), the puny surviving relatives of the gigantic Moas (q.v.), now extinct, but in former times the lords of creation in these islands. The Maoris brought dogs with them, and doubtless the native rat also. Cook gave them pigs, whose wild descendants are still common enough in spots remote from settlement. The colonists introduced the common domesticated animals of Europe, which all thrive to perfection. Many kinds of English birds, and also black swans from Australia have been established in the country, and they are now numerous, and in some cases very troublesome. Most unfortunately rabbits also have been acclimatised, and they swarm in such numbers as to be a serious pest, which it costs more than £100,000 a year to keep in check. Fresh-water fishes of many kinds have been introduced with great success, but salmon have proved hard to establish. The honey and humble bees multiply to an extraordinary degree. In fact, acclimatisation experiments have proved only too successful, and the colony would gladly pay a million or more to be rid of rabbits, sparrows, and linnets alone. Nearly all the native trees and shrubs are evergreen. The most important plants are the timber-trees. The best pine is the kauri, but rimu, matai, and totara are also of great economic value. Many other forest trees—beeches, ratas, puriri, kowhai, &c.—yield excellent timber. The Phormium or native flax thrives best in wet ground, and grows wild in great profusion. The smaller native grasses yield excellent pasture, and the tall 'toi-toi' and Danthonia surpass the well-known pampas grass in elegance of form. Ferns of many kinds greatly abound, including numerous tree-ferns. The fruit and other trees of temperate zones thrive admirably, and a great variety has been already introduced. European grasses and trefoils spread with great rapidity, and so do weeds of every kind, especially sweetbriar, gorse, thistles, cat's-ear, sorrel, and docks. Most of these plants grow with a luxuriance unknown in England. Many garden flowers have also run wild.

Soil and Productions.—The deeper alluvial soils and the extensive tracts of limestone formation are both extremely fertile. Considerable tracts of the Canterbury and the inland plains are shallow and arid, and require irrigation, which is now extensively applied. The rest of the lowlands is clayey and heavier to work, but yields a good return for tillage or under pasture. The best lands of the North Island regularly carry 8 to 10 sheep per acre on the sown pastures alone. On good land wheat yields a return of 60 to 70 bushels an acre, and oats do still better. The average yield of cereals per acre is: wheat, 25 bushels; oats, 32 bushels; and barley, 27 bushels; while potatoes give 5½ tons; and this with the simplest farming, for manuring of any kind is little used. In 1889, to which year all the other statistics refer unless otherwise mentioned, the aggregate production of wheat and oats was 8,448,506 bushels and 13,673,584 bushels. The area ploughed and laid down in grass or crops was 4,414,199 acres, while 3½ million acres were sown with grass without ploughing, chiefly in the fern and forest lands of the North Island. The people are a farming people, and their chief employment is the raising of agricultural and pastoral produce. The volume of these productions may be judged from the present value of the exports, the entire home consumption of the articles exported being of course provided for in addition. Wool amounted to £3,976,375, the produce of 15½ million sheep. The home consumption was 3,556,004 lb. Cereals gave £975,983, wheat being £489,728 and oats £360,086. Including flour, meal, bran, &c., the whole export of grain produce was £1,248,866. This produce went chiefly to Australia, wheat alone going in quantity to London. Frozen, preserved, and salted meats were valued at £922,221, the frozen meat alone reaching £783,374. Nearly a million frozen sheep were shipped to England, and it is believed that the pastures will in a few years yield twice as large a supply. Notwithstanding this enormous drain on the flocks of the colony, they become every year finer and more numerous, since settlers find the rearing of sheep and cattle more remunerative and less toilsome than growing cereals, while the value of their produce is less affected by sudden fluctuations in prices. Kauri gum, chiefly shipped to America, was £329,590. Dairy produce exported reached a value of £213,945, the home consumption of these articles being also very large. The exports of butter and cheese have greatly increased in recent years. Phormium fibre was valued at £361,182, a total many times greater than the average yearly export of this article. See FLAX (NEW ZEALAND). Among miscellaneous exports are skins and hides, £276,393; timber, £199,293; tallow, £159,460; potatoes, £93,996; leather, £65,487; seeds, £45,239; bacon and hams, £31,156;

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hops, £15,965; onions, £12,963; oysters, £8745; fungus (for the Chinese market), £15,903.

Minerals.—The chief mineral product is gold, mainly derived from alluvial workings. The total export up to 1889 was 11,625,028 oz., and for that year 203,211 oz. For years this export has been declining in value, but recent developments of alluvial mining promise a considerable permanent increase. Silver, lead, copper, antimony, and manganese are produced in small quantities, and by crude processes. The coal raised in 1889 was 586,445 tons. The import of this mineral is less than a fifth of the home production, and comes chiefly as return cargo from New South Wales. The coal of the extensive fields near Greymouth and Westport is unsurpassed in quality for gas and steam purposes. Brown coal and lignite are mined in most parts of the colony, and afford supplies of cheap fuel. The other mineral resources are little developed, but the recent success in smelting the iron sand which abounds on the west coast of the North Island seems to prove the dawn of a great and permanent iron-working industry. The number of miners is about 23,000, or 4 per cent. of the population.

Manufactures.—The manufactures are entirely of articles largely consumed in the colony. They are stimulated by high protective duties, are rapidly growing, and afford employment to a large part of the population. The chief are woollen cloths, wools, hosiery, blankets, soap, candles, leather, biscuits and confectionery, boots and shoes, paper, machinery and implements, apparel, ropes and twine, beer, &c.

Trade.—The volume of foreign trade increases every year, and for several years the exports have exceeded the imports. The excess of exports over imports grew from £620,654 in 1887 to £3,042,168 in 1889. This implies that the colony is rapidly paying off old debts. These wiped off, home capital will grow rapidly, and exports will tend to balance imports. In 1889 the total exports were £9,339,265, and the total imports £6,297,097. Of the exports there went to Britain £6,599,682, to Australia £2,145,671, and to the United States £341,362. Of imports, £4,126,311 came from Britain, £1,107,132 from Australia, and £342,436 from America.

Finance, &c.—The consolidated revenue was £4,209,247, and the expenditure £4,121,842. The chief sources of revenue are customs duties (average 25 per cent. *ad valorem*), stamps, post-office, telegraph and railway profits, property-tax, and pastoral rents. The net public debt (March 1890) was £37,284,518, bearing an annual charge of £1,851,421. There were 1813 miles of railway, which cost nearly £15,000,000, and yielded a profit of £412,782, nearly 3 per cent. on the capital invested. The railways have proved an excellent investment. They and the telegraph lines belong to the state, though there are two private railways of considerable importance. The telegraph lines measure 11,827 miles, and a telephone service is provided in all the larger towns. Three submarine cables connect the North and South Islands, and two the colony and New South Wales, thus bringing New Zealand into telegraphic communication with the rest of the world. For the purpose of levying the property-tax, the property in the colony is valued at £218,033,039. All debts deducted, there remains a national capital stock of £128,521,234, created in fifty years by the industry of a community numbering on the average less than the population of a second-rate English city.

Education.—Liberal provision is made for the education of the people, and only 9000 persons above ten years of age are unable to read and write. Elementary education is free, compulsory, and secular. A highly efficient education is given at the 1155 public schools, which are attended by 115,456 scholars, and maintained at a cost of £394,088 a year. There are also 72 schools for the natives (Maoris) alone, costing £16,000 a year. Higher schools for boys and for girls are numerous, and many of them have valuable endowments. These are attended by 2147 pupils, and cost £43,900 a year. There are three university colleges at Auckland, Christchurch, and Dunedin respectively, attended by 588 students. They are affiliated to the University of New Zealand, established by royal charter. It is only an examining body, and has granted 236 degrees in arts, science, medicine, law, and mining.

Settlement, &c.—More than 19 million acres have been already alienated by the crown. There were (December 1889) 37,432 freeholders of areas of 5 acres or more, of whom 35,548 held 1000 acres or less. About 400,000 acres have been taken up for settlement annually for some years. Rural lands may be acquired cheaply, and on most liberal terms. Selectors are restricted to 640 acres of first-class, and to 2000 acres of second-class land. Land is sold for cash mostly at auction, or taken up on deferred payment (the price being paid in equal instalments spread over 14 years), or on perpetual lease, the annual rent being 5 per cent. on the capital value, by paying which the freehold can be secured at any time. The last is much the most popular form of tenure. In 1889 the average price of cash lands was 19s. 6d. an acre, the average yearly instalment on deferred payment lands 1s. 9d., and the average rent on perpetual lease lands 10d.

Population.—In 1851 the white population was 26,707; (1861) 99,022; (1871) 256,260; (1881) 489,933; (1891) 626,830, besides 41,523 Maoris. More than half were born in the colony; 125,657 in England, 54,810 in Scotland, 51,408 in Ireland, and 1981 in Wales. Only 17,884 were of non-British descent. Nowhere out of England does so pure an Anglo-Saxon community exist. There are 4300 Chinese residents. Five-sixths of the people are Protestants. Anglicans predominate in Canterbury, and Presbyterians in Otago, and there are many Wesleyans.

Political Divisions, &c.—Up to 1876 the North Island was divided into four provinces: Auckland, Hawke Bay, Taranaki, and Wellington; and the South Island into five: Nelson, Marlborough, Canterbury, Westland, and Otago. These are now known as provincial districts, and, though subdivided into numerous counties, retain great geographical importance, as they mostly form distinct natural divisions of the country. Wellington is the capital and seat of government (pop. 30,000). Auckland is the largest city (pop. 50,000). The other chief towns are Napier, Wanganui, and New Plymouth in the North Island; and Nelson, Blenheim, Christchurch (40,000), Timaru, Oamaru, Dunedin (44,000), and Invercargill in the South Island. Stewart Island has a sparse population on the north-east coast, and several excellent harbours.

Maoris.—The Maoris, as the natives call themselves, belong to the Polynesian race. Tradition says they came to New Zealand twenty-seven generations ago from Hawaiki, an island of the Pacific not identified with any certainty; but the real date of their migration is quite unknown. They probably displaced or absorbed an earlier and darker indigenous race, and this mixture would explain the diversity of type still found among them. From the first they were brave, generous, and warlike. About as tall as Englishmen, they have strong muscular frames, with legs that are short for their stature. The head is well shaped, and, though the lips are generally thick, the features are not unpleasing, and are often handsome. The skin is

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usually an olive-brown. Most of them have long black slightly waved hair, but in some it is reddish. Tattooing, once practised by both sexes, is now almost abandoned. The punctures were made with a hammer and a small-toothed chisel, and were stained with the soot from kauri gum. The patterns, which extended over the face, hips, thighs, &c., consisted of ornamental spirals and scrolls, elaborated according to the wearer's rank. The women were but slightly adorned in this fashion. The priests had great influence, and could at will make any person or object 'tapu' or Tabu (q.v.)—i.e. sacred and inviolable. This was partly a religious and partly a political institution, and it was always respected by mutually hostile tribes, even in times of war. Cannibalism was universally prevalent as part of their system of warfare. The last known instance of it occurred in 1843. Infanticide, commonly practised in their heathen days, is now everywhere abolished, as is the case with slavery and polygamy. They marry early, but have few children, three to a family on the average. Many die in infancy and childhood. At the time of Cook's visit, and down to the formation of the colony, the tribes lived in a chronic state of warfare. They fought with clubs and spears of heavy wood and stone, and made excellent fortifications. Their most remarkable weapon was a short club, often made of nephrite, and called a *mère*. Among the chiefs these weapons descended from father to son, and were regarded as precious heirlooms. Other nephrite weapons were highly valued and very costly. Firearms are now in common use among them, but in the olden time they had no knowledge of pottery and metals or even of the bow and arrow. Their alphabet contains only fourteen letters, and every word and syllable ends in a vowel. Their names of places, rivers, &c. have generally passed into current use among the colonists. The language is rich and sonorous, and well adapted for the oratory, songs, and lyric poetry of which they were passionately fond. Five-sixths of their numbers are nominally Christians. Those living within or on the border of settlement are becoming gradually assimilated to the colonists, wearing European dress, &c. In remote parts they are even now content with a blanket for a garb. They still own large areas of land, on which they raise crops and keep great numbers of sheep, but they are not very industrious. They all wish to have their children educated, and send them regularly to school. They have a special franchise, and elect four members to the House of Representatives; two of their chiefs are members of the Legislative Council. In Cook's time they numbered 100,000, but there are now no more than 42,000, who almost all live in the North Island. The 'King movement' has at length died out, and the haughty and sullen 'King tribes' are giving up the seclusion into which they retired after the last native war.

History.—Tasman discovered the islands in 1642 and called them *Nova Zeelanda*, but Cook first made them known to the world. He surveyed the coasts and learned a great deal about the people in 1769 and following years. At the beginning of the 19th century whaling-ships began to frequent the coasts and to have intercourse with the natives, while a trade in kauri spars and native flax sprang up with the young settlement at Sydney Cove. This trade was stimulated by the eager desire of the Maoris for guns, tools and utensils of iron, and blankets. The introduction of guns made the constant tribal wars more deadly than ever, and brutal slaughter greatly thinned the number of the people. The continual fighting and disorder caused the British government to include the islands in the territory of New South Wales, and soon led to the cession of the colony to the British crown by the treaty of Waitangi (1840). By this treaty the native title to the soil was guaranteed, and every acre since sold has been duly paid for. Missionaries settled in the north in 1814, and soon formed a network of stations over the North Island. Within twenty years their labours were crowned with remarkable success, not only in converting the people, but equally in encouraging a more peaceful and civilised mode of life. The colony was planted in 1840 by the New Zealand Company, who with auxiliary associations founded successively the settlements of Wellington, Nelson, Taranaki, Otago, and Canterbury. The earliest and most irregular settlement was at the Bay of Islands. For a time the capital was fixed at Auckland, but in 1865 it was transferred to Wellington. A series of native wars began in 1843 and ended in 1869, since which year the colony has enjoyed complete peace. The wars arose partly from jealousy of the power and influence of the colonists, but chiefly from endless disputes about land sales, which were greatly complicated by the vague tribal tenure on which land was held by the natives. All through the wars, which were brought to an end by the unaided colonists, the trade and population of the colony grew at a rapid rate. Self-government was granted in 1852. The provinces created by the Constitution Act were abolished in 1875, and the government centralised and strengthened, while a complete system of local government by county and borough councils was soon after established. The government consists of a governor appointed by the crown, and a legislature composed of an upper chamber named the Legislative Council, with members appointed for life, and a lower chamber named the House of Representatives, elected for three years.

See descriptive works by Hochstetter (Eng. trans. 1877), Bradshaw (1889), Gisborne (1889), Wakefield (1890); Dilke's *Greater Britain* (1868), and *Problems of Greater Britain* (1890); Froude's *Oceana* (1886); handbooks such as Clayden's (1885) and Brett's (1890); the *Australian Handbook* and the official publications; histories by Rusden (1883) and Firth (1890); Jacobs, *New Zealand*, in the 'Colonial Church Histories' (1890); Tucker's *Life of Bishop Selwyn* (1879); Gisborne, *New Zealand Statesmen* (1885); Kerry-Nicholls, *The King Country* (1883); Green, *The High Alps of New Zealand* (1883); Buller, *Birds of New Zealand* (1882); and Hooker, *Flora of New Zealand* (1864–67); works on the Maoris, their traditions and superstitions, by Shortland and by White; and on their language by Maunsell (1844) and Williams (1862 and 1877).

New Zealand Flax. See FLAX (NEW ZEALAND).

Ney, MICHEL, one of the most famous marshals of the great Napoleon, was born a cooper's son at Saarlouis, 10th January 1769. He was a non-commissioned officer in a hussar regiment when the Revolution began, but in the new order of things his merit quickly brought him promotion, and during the blockade of Mainz (1794) Kléber made him his adjutant-general. In 1796 he served under Jourdan, and earned the rank of general of brigade on the field of Forchheim. For the capture of Mannheim by a daring *coup de main* he was made a general of division in 1799. He was interim commander of the Army of the Rhine for a short time, during which he frustrated by a bold diversion an important movement of the Archduke Charles against Masséna and the Army of Switzerland. After the peace of Lunéville Bonaparte brought about his marriage with Aglae Louise Auguié de Lescans, a young friend of Hortense Beauharnais, and appointed him inspector-general of cavalry. On the establishment of the empire he was made marshal of France. In 1805 he stormed

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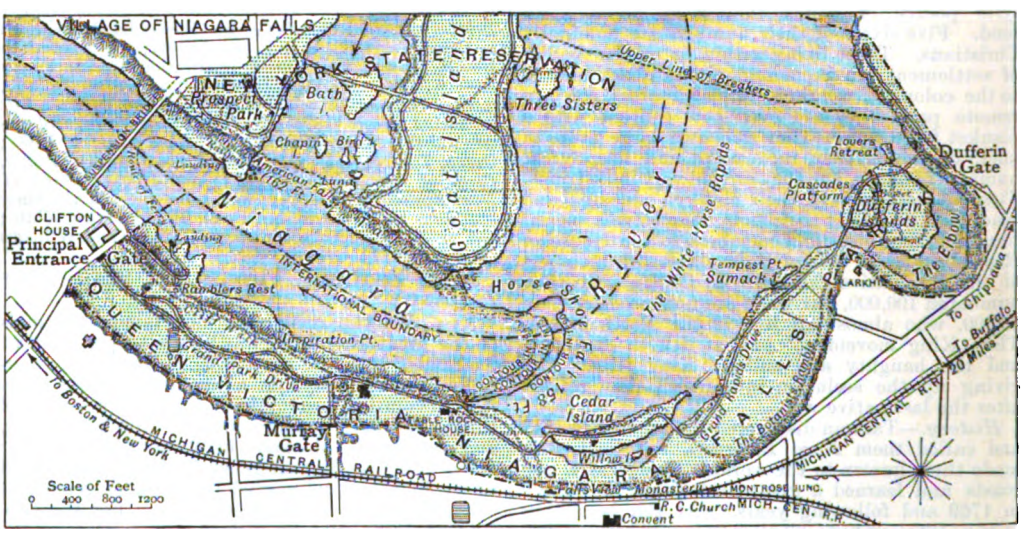
the entrenchments of Elchingen, for which he was created Duke of Elchingen. He distinguished himself anew at Jena and Eylau, and his conduct at Friedland earned him the title from Napoleon of 'le brave des braves,' and the grand-eagle of the Legion of Honour. He next served in Spain, but quarrelled with his superior Masséna about the plan of the campaign and returned to France, where he remained inactive till in 1812 he received the command of the third corps in the Grand Army. He covered himself with glory at Smolensk and Borodino (q.v.), and was rewarded with the title of Prince of the Moskwa. He led the rear-guard in the disastrous retreat, and his sleepless vigilance alone saved the remnant of the Grand Army. In 1813 he opened the battle of Lützen, and showed his usual capacity and courage at Bautzen, but was defeated by Bülow at Dennewitz. He fought heroically throughout the fatal struggle at Leipzig, and was also in the last defensive campaign of 1814; but after the capture of Paris he urged the emperor to abdicate, and submitted to Louis XVIII., who loaded him with favours. On Napoleon's return from Elba Ney was sent against him at the head of 4000 men; but the old enthusiasm proved too much for him, and with most of his soldiers he went over to his old master's side. In the final campaign he commanded the first and second corps, opposed Brunswick at Quatrebras (June 16), and led the centre with more than bravery at Waterloo; twice—once at the head of the cavalry, last with the Old Guard—he strove to break the English force in vain. During the day he had five horses shot under him. After the capitulation of Paris he yielded to the entreaties of his family to set out for Switzerland; but a costly Egyptian sabre, the gift of Napoleon, led to his being suspected by an official, and arrested near Aurillac. He was condemned to death for high-treason, and was shot in the garden of the Luxembourg on 7th December 1815—a cruel act of revenge that might well have been spared the bravest among the sons of France. Even the cost of the prosecution, 25,000 francs, was extorted from his unhappy widow. He left three sons, who published his *Mémoires* (2 vols. 1833).

Nez Percés, a tribe of American Indians, settled in Idaho, on the Lapwai River. The Nez Percés 'proper' have always been loyal to the whites, and are making good progress in civilisation. But in 1877 the treaty reductions of their reservation led to a sanguinary outbreak on the part of the 'non-treaty' Nez Percés, who murdered settlers, fought the soldiers, and then fled across Idaho, Montana, and Dakota. They were overtaken and beaten, and the survivors (some 350) transferred to Indian Territory; but in 1885 some were restored to Idaho, and the rest joined the Colville Indians, in Washington. There is no evidence that they ever had a custom which would justify their name, 'pierced nose.'

Ngami, LAKE, a South African lake, situated at the northern extremity of the Kalahari Desert, in 20° 30′ S. lat. and 23° E. long., at an altitude of 2810 feet. Its extent and depth vary with the fall of rain in the country to the north of it; its average size is 50 miles long and from 10 to 20 broad. The chief tributary, the Okavango or Cubango, called in its lower course the Tioge, brings down from the north-west vast volumes of water. At another season of the year the Suga or Zouga brings in a supply from the east. It is not yet decisively settled whether in times of flood the lake sends off the surplus water to the Zambesi.

Niagara ('Thunder of Waters'), a river of North America, which forms part of the boundary between New York state and the province of Ontario. It flows from Lake Erie to Lake Ontario, a course of 36 miles, during which it makes a total



Plan of Niagara Falls.

descent of 326 feet—about 50 feet in the rapids immediately above the great falls, and nearly 110 feet in the seven miles of rapids below. It encloses several islands, the largest Grand Island, which is nearly 10 miles long. Four miles below this island are the most famous falls in the world. The centre of the river here is occupied by Goat Island, dividing the cataract into two—the Horseshoe (Canadian) Fall, with a descent of 158 feet, and the American fall, 162 to 169 feet; the outline of the former is about 2640 feet, of the latter 1000 feet. The volume of water which sweeps over this immense chasm (nearly nine-tenths passing over the Canadian fall) is about 15,000,000 cubic feet a minute. The depth of water on the crest of the falls is less than 4 feet, except in a few places, notably at the apex of the Horseshoe Fall, where it is about 20 feet. The limestone edge of both falls is rapidly wearing

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away in the centre: the contour lines in the map represent this in the case of the Canadian fall, whose centre now presents the form of a V; in the American fall the same tendency is visible, although the process has begun much more recently. For seven miles below the falls (to the point, that is, where it has been supposed that the falls originally stood) the river is shut in between perpendicular walls of rock, from 200 to 350 feet high. For some distance below the falls there is still water, the body of water which pours over the precipice sinking, and only coming to the surface again two miles below, where the whirlpool rapids begin; a little lower is the whirlpool, where a sharp turn sends the waters hurling against the Canadian side, and then sweeping round in a great eddy before they find a vent at a right angle with their former course. Just below the cataract the river is crossed by a suspension bridge for carriages and foot-passengers, and a mile and a half farther down there are two railway bridges—one a cantilever bridge—about 100 yards apart. On both shores the lands bordering on the river, for some distance above and below the falls, are under the immediate control of the respective governments. The 'New York State Park at Niagara Falls' (1885) embraces 115 acres, and the 'Queen Victoria Niagara Falls Park' (1888) about 154 acres. From both sides visitors, cased in waterproofs, are conducted under the falls.

Niagara, a town of Ontario, popular as a summer-resort, is situated on Lake Ontario, at the mouth of the river Niagara, 15 miles from the falls. Niagara (then Newark) was burned down in December 1813 by the American General M'Clure on his retreat. Pop. 1441.—*Niagara Falls*, a village of New York, is the principal place in the neighbourhood of the falls, and has several flour-mills, and sash and blind factories. The new suspension bridge connects it with the Canadian side, and there is also a bridge to Goat Island. On October 4, 1890, the first sod was cut of a tunnel for utilising the water-power of the falls, to be completed by January 1927; it is to be 1½ mile long, passing under the village. Pop. 3320.—The name Niagara Falls has also been given to Clifton (q.v.).

Niam-niam, an African people dwelling between 4° and 6° N. lat. and 25° and 30° E. long., along the watershed that parts the feeders of the Bahr al-Ghazal from those of the Welle-Makua and other northern tributaries of the Congo. They are a branch of the A-Sandeh tribes, who all belong to the stock of the negroid Nubas. In person they have round faces, broad heads, bodies long in proportion to the legs, and are inclined to corpulency. The men dress their hair in the most elaborate fashions, chiefly of long plaits and tufts. They colour their chocolate-brown bodies red with a vegetable dye. Whilst the men devote themselves to hunting and war, the women cultivate the fields of eleusine, manioc, sweet potato, gourds, yam, banana, &c. These with game are the chief food, though a portion of the people are notorious cannibals. They have no cattle. Considerable manual and artistic skill is shown in the forging of iron, making of pottery and baskets, and the carving of wood. They are passionately fond of music, and play a kind of mandolin. Although polygamy prevails, the warriors have an affectionate regard for their wives. The weapons are spears, knives, a species of iron boomerang, and shields. The dead are buried. It is to these people that the legends of 'tailed men' are referable (see Baring-Gould, *Curious Myths*, 1875). See also Schweinfurth, *Heart of Africa* (1878); and Junker, *Travels in Africa*, vol. ii. (1891).

Nias, an important island belonging to Holland, lies to the west of Sumatra, and has an area of about 2100 sq. m. The surface is mountainous, the highest peak rising 1970 feet. In 1857, when the Dutch took complete possession of the island, the population was reckoned at 170,000. They grow rice, cocoa-nuts, bananas, tobacco, sugar-canes, &c., and annually about 110,000 lb. of pepper. The Niassers are of the Malay race, but fairer than the Malays usually are. They are gentle, sober, and peaceful, remarkably ingenious in handicraft. See *Roy. Scot. Geog. Mag.* for 1888 and 1891; and Modigliano, *Un Viaggio a Nias* (1890).

Nibelungenlied, also called DER NIBELUNGE NÔT, an old German epic poem, that takes rank next after the Homeric poems amongst the great epics of the world. The original substratum of the work is undoubtedly the saga of Sigurd, recounted in the Elder Edda; it is from that source the epic derives its mythological elements, and in all probability the tragic conception of an all-compelling destiny which dominates the action of the poem. To this original substratum must be added two others—one taken from the legendary history that grew up out of the migrations of the peoples, especially the struggle between the Huns and the Burgundians; the other embodying the spirit, the sentiment, the life and circumstances of the crowning age of chivalry, the middle of the 12th to the middle of the 13th century, during which period the poem, as we now have it, was unquestionably written. Who was its author, or rather the man who cast it in its present form, is altogether unknown; the attribution of it to the minnesinger of Kürenberg in Upper Austria now finds very little acceptance. The oldest elements of the work must have been long current in the form of popular songs or versified sagas; but the incidents of the story as recounted in the epic seem to have been fused into a unity some time previous to the 12th century. The existing version is due to one who was steeped in the ideas of the courtly poetry of the middle ages; the writer took the story that had in process of time grown together into a connected epic narrative, and impressed upon it his own methods of poetic vision, and his own peculiar versification—in short, his own style. German commentators are of opinion that the writer worked from originals composed in Latin. After the Reformation all interest in the poem quite died out, and was only revived in the end of the 18th century. But it was not until twenty years and more of the 19th century had passed that German students began to be aware of the inestimable literary treasure they possessed in the *Nibelungenlied*. A keen discussion arose as to its unity; one school, headed by Lachmann, maintained that it was merely a collection of folk-songs, loosely strung together, or rather intermingled one with another; an opposing school defended the unity of the narrative and of the poem. The views of the latter body of scholars are now generally accepted.

The narrative is briefly this. Sigfried, the son of the king of the Netherlands, has become the possessor of the storied treasure of the Nibelungs, which carries with it the curse of dire evil to its owner. Sigfried marries Kriemhild, sister of Gunther, king of Worms, and then helps Gunther to win to wife Brunhild of Iceland, by taking Gunther's place without her knowledge and overcoming her in three trials of bodily skill and strength. After some years a bitter dispute breaks out between the heroines as to whether Gunther or Sigfried is the greater. Brunhild's jealousy is so great that she induces Hagen, one of Gunther's vassals, to murder Sigfried. Kriemhild, though she mourns long years for her husband, at length marries Etzel (Attila), king of the Huns. After Sigfried's death she had become the possessor of the

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Nibelungs' treasure; but Hagen had wrested it from her and sunk it at the bottom of the Rhine. At the end of several years Kriemhild, who still mourns for Sigfried, and still nourishes the desire for revenge upon Hagen and Gunther, invites her brother and his court to visit her. They do so, accompanied by a body of 11,000 knights and men-at-arms. The conclusion of the epic relates the bloody incidents attendant upon the total annihilation of the Burgundians at the court of Etzel, and the slaughter they made amongst their foes. There is a continuation of the poem, called the *Nibelungenklage*, or Lament for the Nibelungs, a production in every way much inferior to the *Nibelungenlied*. In spite of the uncouth versification of this last, it exercises a strong fascination upon the reader, owing to the grandeur of its conception, its strong characterisation, its earnestness and tragic intensity.

There exist numerous old MSS. of the poem; but the most valuable are three, called respectively the Munich, St Gall, and Lassberg MSS., all of the 13th century. The best modern High German versions are those by Simrock (40th ed. 1880), Bartsch (2d ed. 1880), and L. Freytag (2d ed. 1886). There are English translations by Lettsom (1850), Foster-Barham (1887), and Birch (3d ed. 1887). See also Carlyle's *Miscellanies* (vol. iii.).

Nicæa. See NICE.

Nicaragua, an independent state of Central America, stretching right across the isthmus from the Caribbean Sea to the Pacific, between Costa Rica on the south and Honduras on the north. An irregular square, the east (Caribbean) coast measuring 290 miles and the west coast 185, Nicaragua has an area of about 51,650 (or 58,000?) sq. m. The Central American Cordilleras form the backbone of the country; they run north-west and south-east at a distance of 12 to 30 miles from the Pacific, and attain elevations of 4000 and 5000 feet above sea-level. On the west the surface sinks rapidly to a longitudinal depression (110 feet), the southern two-thirds of which are filled by the large lakes of Nicaragua (115 miles long, 45 broad, and 140 feet deep in most parts) and Managua (35 miles long, 20 broad, 30 feet deep), the latter lying north of the former and 25 feet higher. This depression is studded with a chain of volcanic cones, standing on islands in the lakes (Ometepec and Madera, 4190 feet), and clustering thickly between the northern end of Lake Managua and the Gulf of Fonseca at the north-western extremity of the country, as Coseguina (3835 feet, which was the scene of a tremendous outbreak, lasting over four days, in 1835), Viejo (6267), Telica (4200), Momotombo (6890), Mombacho (4600), and several others. Though most of these are quiescent, some of them burst forth in eruption from time to time; Ometepec poured out its lavas during seven days in 1883. Another low range separates this depression from the Pacific. The districts west of the central backbone are the chief seats of the population. There stand the towns Managua (the capital), Leon, Granada, Chinandega, Rivas. On the western coast there are three harbours—the Gulf of Fonseca in the north, Salinas Bay in the south, and the port of Corinto towards the north. The only port on the east side is Greytown, at the mouth of the river San Juan.

East of the Cordilleras the surface falls away gradually; the spurs that break off from the main ridge sink into the low alluvial plains that face the Caribbean Sea. Thick forests clothe extensive areas on this side. Several rivers carry off the surplus water eastward, a few being of good length, such as the Coco or Wanks (350 miles long), which serves as the conventional northern boundary; the San Juan (125 miles), which drains Lake Nicaragua and separates the state of Nicaragua from Costa Rica on the south; the Bluefields and the Rio Grande (230 miles). The low coast-belt, called the Mosquito Territory (q.v.), is lined with salt lagoons—Pearl lagoon having an area of 200 sq. m., and Bluefields lagoon half as much. The mountain-spurs east of the main chain are rich in minerals; gold is mined in the neighbourhood of Libertad on to Matagalpa, in the heart of the country, and silver near the sources of the Coco in the north; coal, copper, tin, iron, lead, zinc, antimony, quicksilver, marble, &c. exist, but are not worked. As a rule the climate varies between 70° and 90° F., and there is a dry season lasting from about December to May. The natural products of the soil are accordingly tropical. The forest trees include mahogany, rosewood, logwood, fustic, sandalwood, india-rubber, and numerous others that yield fancy woods, medicinal plants, gums, and dye-woods. Large herds of cattle are bred and reared on the extensive plains of the centre and east. The rich soil of the cultivated western region yields maize (the staple food of the people), coffee, cocoa, sugar, cotton, rice, tobacco, indigo, and a great variety of tropical fruits. The exports—chiefly coffee, india-rubber, bananas, hides, metals, gums, woods—average £304,000; the imports, mostly manufactured goods, £429,000. The animal life is similar to that of Guatemala (q.v.). The population are stated to have been 259,794 in 1884, one-third Indians, and one-half mulattoes and negroes. The state religion is the Roman Catholic, but all creeds are tolerated. The educational standard is low, in spite of two universities (so called), at Leon and Granada, with about 350 students in all. The country is governed by a president (elected for four years), a legislative assembly of eleven members, and a senate of ten; both these bodies are elected by the people, the former for four, the latter for six years. There are 100 miles of railway, connecting the chief towns with Corinto. The public revenue (£152,600) is derived chiefly from monopolies on spirits, tobacco, and gunpowder, and from import dues. The national debt amounts to £603,000.

Nicaragua, like the states north of it, was a centre of Aztec civilisation; but the Aztecs were preceded by another race, likewise civilised, who have left stone sculptures and monumental remains. The Aztec influence survives in archæological ruins and relics and in the Indian dialects. Columbus sailed along the Mosquito coast in 1502. Twenty years later the country was overrun by the Spaniards under Gil Gonzalez D'Avila, and in 1524 the city of Granada was founded. This town soon developed as the head of a stream of commerce that flowed up and down the San Juan River. In 1610 was founded Leon, the democratic rival of the aristocratic Granada. During the Spanish supremacy (after 1550) Nicaragua was a province of Guatemala. In 1821 it asserted its independence, and two years later joined the federation of the Central American states, a connection that lasted sixteen years. The history of the country after the severance from Spain until 1865 is a record of war and dissension, war with Costa Rica, with Guatemala, and with Great Britain (1848), which had asserted a protectorate over the Mosquito Coast since 1655. This region was given up to Nicaragua in 1860. Between 1855 and 1860 the aristocratic and the democratic party were fighting tooth and nail, the latter being assisted by the adventurer William Walker (q.v.). Since then Nicaragua has made laudable efforts to develop her resources and to advance along the path of civilisation, and she now compares most favourably with her sister states in Central America.

See Squier, *Nicaragua* (1852); Belt, *Naturalist in Nicaragua* (1873); Bodham-Whetham, *Across Central*

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America (1877); Levy, *Notas Geograficas y Economicas sobre Nicaragua* (Paris, 1873); Bancroft, *History of Pacific States: Central America* (1832); and Bouvallius, *Nicaraguan Antiquities* (Stockholm, 1886).

Nicaragua Ship-canal. The plan of cutting a canal through Central America by way of the San Juan River and Lake Nicaragua is by no means new. But the project was not taken up in earnest until 1884, when a treaty with this object in view was signed between the United States and Nicaragua. The Nicaragua Canal Company was formed early in 1889, and operations were commenced at Greytown, at the mouth of the San Juan, in November of the same year. During the first year of work the harbour was dredged, a pier built, and some 10 miles of railway constructed, and the ground cleared for excavation. The plans have been prepared by A. G. Menocal of the United States navy. The canal utilises the San Juan and Lake Nicaragua, and will have a total length of 170 miles; of this distance 121 miles will be free navigation on the river (64½ miles) and lake (56½ miles), 21 miles free navigation on basins formed by damming small streams, and 28 miles only will be excavated. A breadth of only 12 miles, with a low divide (152 feet above sea-level), intervenes between the lake and the Pacific; this will be traversed from the lake exit near Rivas to Port Brito by basin navigation and cut stretches of artificial canal. There will be three locks on each side of the lake (110 feet above sea-level), and there will be a minimum depth of 30 feet of water in the canal. It was estimated that the works would cost about £12,000,000, that they would be completed in six years, and that vessels would be able to pass from ocean to ocean in 28 hours.

Niccola Pisano. See PISANO.

Nice (Ital. *Nizza*), chief town of the department of the Alpes Maritimes, France, stands on a beautiful well-sheltered site on the coast, 140 miles E. by N. of Marseilles and 110 SW. of Genoa. On the north of the city the hills rise in terraces and shield it from the cold winds. On the south it faces the sea, which tempers the heat in summer. Owing to the advantages of its situation, Nice has for many long years been celebrated as a winter-resort for invalids; the number of visitors is usually estimated at 15,000, but in the winter of 1889 and 1890 they reached 40,000 to 45,000. The mean temperature of winter is 49° F., of summer 72°. Frosts occur but seldom. Pop. (1872) 42,363; (1886) 65,053 (commune, 77,478). The city consists of three parts—the New Town on the west, the Old Town, and the Port on the east. The first of these is the part frequented by foreigners, particularly English (whence its name of 'English town'). Beautiful promenades stretch along the seashore, and are overlooked by villas and hotels. Numerous bridges across the little river Paglione (Paillon) connect the New Town with the Old or Upper Town. This part, with narrow streets, clusters at the foot of a rocky height, the Castle Hill; on the other (east) side of this hill is the harbour, which was enlarged to twice its original size in 1889, and deepened to 25 feet. The Castle Hill is an isolated mass of limestone 318 feet high, formerly crowned by a strong castle, now in ruins, and is laid out in public gardens. The chief public buildings are the cathedral, the Gothic church of Notre Dame, the natural history museum, art gallery, library, observatory, casino, &c. The people manufacture artistic pottery, perfumery, and Italian pastes, grow flowers and southern fruits, the last of which they preserve, and produce inlay work in olive-wood. Most of these things are exported, chiefly by way of Genoa and Marseilles. The exports from the port of Nice range in annual value from £94,656 to £56,982, the greater portion being for olive-oil. The imports, varying from £570,687 to £1,809,590, consist of wine, oil, and cereals, with smaller quantities of coal, charcoal, timber, bran, and flour. The ancient Ligurian town of Nicæa, founded by a colony of Phocæans from Massalia (Marseilles), became subject to Rome in the 2d century B.C. It was in the hands of the Saracens during the greater part of the 10th century. Then, after existing as an independent city, it acknowledged the supremacy of the Counts of Provence and the House of Savoy (1388). In 1543 it was taken and pillaged by the Turks under Barbarossa. From 1600 onwards it was repeatedly taken by the French; and they kept possession of it from 1792 to 1814. In 1860 it was ceded to France by Sardinia (Savoy). Masséna was born near to the city, and Garibaldi in it. See Nash, *Guide to Nice* (1884).

Nice, or NICÆA, a city of ancient Bithynia, in Asia Minor, situated on the eastern shore of Lake Ascania. It was built by Antigonus, the son of Philip (316 B.C.), and received the name of Antigoneia, which Lysimachus changed to Nicæa, in honour of his wife. It was a handsome town, and of great importance in the time of the Roman and Byzantine emperors. It is famous in ecclesiastical history for two Councils held in it, the First and Seventh Ecumenical Councils. The First Council of Nice was held 325 A.D., and was convened by the Emperor Constantine, for the purpose of defining the questions raised in the Arian controversy (see ARIUS, ATHANASIUS); the Nicene Creed adopted is discussed at CREED. The Council also deliberated on the Meletian Schism; and its decree on the celebration of Easter met with universal acceptance. See Stanley's *History of the Eastern Church*.—The Second Council assembled under the Empress Irene (787), for the purpose of reconsidering the subject of Images (see IMAGE-WORSHIP).

Nicholas, the name of five popes and an antipope. NICHOLAS I. was born of a noble Roman family, and was elected as successor to Benedict III. in 858. He showed great persistence in his endeavours to assert the supremacy of the Roman curia, especially in his successful disputes with Archbishop Johannes of Ravenna, Archbishop Hincmar of Rheims, and the patriarch Photius of Constantinople. His latest triumph was the restoration to her rights of Thietberga, the unjustly divorced wife of the Emperor Ludwig's younger brother, Lothaire, king of Lorraine. A synod of Metz in 862 had allowed the king to put her away and marry his mistress, but the pope reversed the judgment and deposed the too compliant Archbishops of Cologne and Treves. Nicholas died in 868.—NICHOLAS V. was originally called Thomas Parentucelli. Born at Pisa in 1398, he was educated at Florence and Bologna, and was named Bishop of Bologna by Eugenius IV. He showed such astuteness during the troubles of the Councils of Basel and Florence that he was chosen to succeed Eugenius IV. in 1447. He prevailed on the antipope, Felix V., to abdicate, and thus restored the peace of the church in 1449. He was a liberal patron of scholars, and despatched agents both to the East and West, to purchase or to copy important Greek and Latin manuscripts. The number collected is said to have exceeded 5000. He remodelled, and may almost be said to have founded, the Vatican Library. He invited to Rome the most eminent scholars of the world, and extended his especial patronage to those Greeks whom the troubles of their native country drove to seek a new home in the West. He endeavoured to arouse the Christian princes of Europe to the duty of succouring their brethren of the East; but the age of enthusiasm was past, and

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he was forced to look on inactive at the fall of Constantinople in 1453. Nicholas died in 1455, at the comparatively early age of fifty-seven. He must not be confounded with an antipope of the same name, Peter de Corbario, who was set up, in 1328, by Ludwig of Bavaria, in antagonism to John XXII. (q.v.). See also NICOLAS (ST).

Nicholas I., emperor of Russia, was the third son of Paul I., and was born at St Petersburg, 7th July 1796. He was very carefully educated under the eye of his mother, a princess of Würtemberg, and subsequently devoted his attention to military studies and political economy. He visited England and other European countries in 1816, and in the same year made a tour through the Russian provinces. On 13th July 1817 he married the eldest daughter of Frederick-William III. of Prussia—a union that long affected European politics—and lived in domestic retirement till the death of Alexander I. (December 1825), when, owing to the resignation of his elder brother Constantine, he succeeded to the throne of Russia. A long-prepared military conspiracy broke out immediately after his accession, which he suppressed with great vigour and cruelty. After a brief ebullition of reforming zeal, he reverted to the ancient policy of the czars—absolute despotism, supported by mere military power.

Soon after his accession a war with Persia commenced, but it was concluded by the peace of Turkmanshai (1828), which gave a considerable extent of territory to Russia. In the same year he entered upon a war with Turkey, in which victory, though at enormous cost, constantly attended his arms, and the peace of Adrianople obtained for Russia another increase of territory. The political movements of 1830, in the west of Europe, were followed by a national rising of the Poles, which was suppressed after a desolating contest of nine months, in which the utmost efforts of the whole military resources of Russia were required. Nicholas punished the rebellion by converting the kingdom of Poland into a mere Russian province, and strove to extinguish the Polish nationality. This policy, however, was viewed with great dissatisfaction throughout Europe, and the vanquished Poles were everywhere regarded with general sympathy. Russia, by Nicholas's mode of government, became more and more separated from the fellowship of the western nations. Intellectual activity was, as far as possible, restrained to things merely practical, education limited to preparation for the public service, the press was placed under the strictest censorship, and every means used to bring the whole mind of the nation under official guidance. His Panslavism (q.v.) also prompted him to Russianise all the inhabitants of the empire, and to convert Roman Catholics and Protestants to the Russian Greek Church, of which the czar is the head. War was waged against the mountaineers of the Caucasus with the greatest energy and perseverance, at the cost of immense sacrifices both of money and lives. The extension of British influence in central Asia was also viewed by him with alarm, and led to an unsuccessful expedition to Khiva. During the political storm of 1848–49 he abstained from interference until an opportunity was found in the request of the emperor of Austria for his assistance to quell the Hungarian insurrection. He succeeded at the same time in drawing closer the bonds of alliance between the Russian and Prussian monarchies. The re-establishment of the French empire still further tended to confirm these alliances, and led Nicholas to think that the time had at length come for carrying into effect the hereditary Russian scheme for the absorption of Turkey; but the unexpected opposition of Britain and France, and his own invincible repugnance to give up his long-planned scheme of conquest, brought on the Crimean War (q.v.), during the course of which he died at St Petersburg, March 2, 1855. He was remarkable for temperance, frugality, and patriotism, and was fanatically beloved by his Russian subjects; he was at the same time regarded by them with feelings of awe, a tribute to his lofty stature and imperial bearing. See Lacroix, *Histoire de Nicolas I.* (8 vols. 1864-73).

Nichols, a family of printers and antiquaries, associated with the *Gentleman's Magazine* from 1778 to 1856. To it belonged John Nichols (1745–1826); his son, John Bowyer Nichols (1779–1863); and his son, John Gough Nichols (1806–73).

Nicholson, JOHN, a distinguished Indian soldier, was born in Dublin, 11th December 1822. In 1838 he joined the East India Company's service, and in 1840 his regiment was ordered to Ghazni in Afghanistan (q.v.), where, two years later, it was compelled to surrender to the enemy. After a time of miserable captivity he regained his liberty. On the breaking out of the Sikh war in 1845 he served in the campaign on the Sutlej, and was present at the battle of Ferozeshah. He was now appointed assistant to the resident at the conquered capital, Lahore. During the Sikh rebellion of 1848 he greatly distinguished himself, the preservation of the important fortress of Attock being due to his daring and promptitude, whilst soon after, at the Margulla Pass, he succeeded in intercepting and defeating a large body of the insurgents. At the battles of Chillianwalla and Gujrat successively he earned the special approval of Lord Gough, to whom he was immediately attached. The Punjab having finally become a British province, Captain Nicholson was appointed a deputy-commissioner under the Lahore Board. His success in bringing the savage tribes under thorough subjection to law and order was something marvellous.

In the mutiny in 1857 Nicholson perhaps did more than any other single man to hold firm the British grasp of the Punjab. He it was who suggested the formation of the famous movable column, and he presided over its organisation; while in his dealings with the suspected regiments of sepoys he exhibited throughout a brilliant combination of boldness with subtlety, discretion, and astuteness. At Trimmoo Ghaut on the 12th and 14th July he nearly annihilated a force of rebels, and at Najafgarh on the 24th he dispersed another body of mutineers. As brigadier-general, on September 14 he led the first column of attack at the siege of Delhi, and after the troops had forced their way into the city he still exposed himself in the most fearless manner, and fell, shot through the body. He died on 23d September 1857. Over the whole of India it was felt that, to use Lord Canning's expression, 'a tower of strength' had fallen.

See Kaye's *Lives of Indian Officers* (2 vols. 1867; new ed. 1889); R. Bosworth Smith's *Life of Lord Lawrence*; and Edwardes and Merivale, *Life of Sir J. Lawrence.*

Nicias, a famous Athenian statesman and general during the Peloponnesian war, was the son of Niceratus, a very wealthy citizen, who had acquired his fortune by working the silver-mines at Laurium. He belonged to the aristocratic party, and after the death of Pericles was the chief opponent of the demagogue Cleon, and later of Alcibiades. In 427 B.C. he captured the island of Minoa, next year he ravaged the island of Melos and the coasts of Locris, the next he compelled the Spartan force in Sphacteria to surrender, and defeated the Corinthians. In 424 he ravaged part of Laconia and captured the island of Cythera. After the death of Cleon he brought about a peace between the Spartans and Athenians, 421. Six years later the Athenians at the instigation of

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Alcibiades resolved on a great naval expedition against Sicily. Nicias was appointed one of the commanders, although he had strongly protested against the undertaking. In the autumn of 415 he laid siege to Syracuse, and was at first successful, but subsequently experienced a series of disasters; his fleet was destroyed, and his troops began a retreat towards the interior of Sicily. They were speedily forced to surrender, and Nicias was put to death in 414. See the Histories of Thirlwall and Grote, and Plutarch's *Life of Nikias* (ed. by H. A. Holden, 1887).

Nickel (sym. Ni; atom. wt. 58·6; sp. gr. 8·3 to 8·7). This metal was discovered by Cronsted in 1751; but long before he isolated the metal, alloys of it obtained from ore were used by the Chinese. Within living memory it was considered a feat to fuse a piece of nickel as large as a hazel-nut, so that it may be said to be a comparatively recent addition to the useful metals. It was shown by Richter in 1804, and again by Deville in 1856, that the pure metal is malleable and ductile and of higher tenacity than wrought-iron. Nevertheless the only application of nickel previous to 1879 was as a constituent of certain alloys—German Silver (q.v.), for example—usually for the purpose of giving them a white colour. In that year Fleitmann of Iserlohn, having previously ascertained that the brittle nature of all commercial nickel was due to occluded carbonic oxide, discovered that the addition of one-eighth per cent. of magnesium (which requires to be made with due precaution in an atmosphere of carbonic acid) conferred upon it the malleability of the pure metal. He was likewise successful in welding nickel thus refined to wrought-iron so thoroughly that two pieces of these metals—i.e. one of each—joined in this way could be rolled out into a very thin sheet without any break in the continuity of either surface. Fleitmann's firm have turned this to useful account by manufacturing cooking-pots and other articles iron-plated with nickel on both sides. The action of organic acids on nickel is so slight that these cooking utensils may be safely used. Nickel can also be made malleable by the addition of metallic manganese in the proportion of 5 parts of the latter to 100 parts of the former. This process was patented by Messrs Wiggin of Birmingham on 11th March 1880, specification No. 1058. Wharton in 1873 or earlier made vessels in America of pure nickel rendered malleable by forging it in a spongy state with a steam-hammer.

Nickel is of a white colour, its peculiar hue being between that of silver and bright steel. It is not altered by exposure even to moist air, and it is not tarnished by sulphuretted hydrogen. Dilute sulphuric and hydrochloric acid attack it only slowly, but it dissolves readily in nitric acid. Caustic alkali lyes have no action upon the metal. Owing to these properties and to its having the strength and malleability of wrought-iron, nickel is a valuable metal for many purposes. Besides its use in forming highly serviceable alloys with copper and zinc, of which German silver and some of the white compounds used for coinage on the continent of Europe are the most important, it is employed alone for nickel-plating, for chemical vessels, and, as has been stated, for coating iron cooking-pots in thin layers. An electro-deposit of nickel on steel instruments, such as those used in surgery, is specially useful in preventing rust. Magnets are sometimes made of nickel; and now that it can readily be made pure enough to be welded, rolled into sheets, drawn into wire, stamped, or raised by beating, it is likely to receive new applications. In 1890 it was reported that the Americans had proved by trials at Annapolis that armour-plates of steel alloyed with nickel are superior to such plates made of steel itself; and preparations were made in other countries to try this nickel-steel on a large scale. In 1873 the price of nickel rose from 4s. to 16s. per lb. on Germany adopting a nickel alloy for coinage. Owing to the now abundant supply, it has fallen to 2s. per lb. In 1889 it was announced by the German chemist Kruss that he had succeeded in splitting up nickel and cobalt each into two parts, and that both these metals have one component in common; but this has not been confirmed by subsequent research. See the *Chemical News* (1889).

Ores of Nickel.—Till about 1875 the most important ore was *kupfer-nickel* (false copper). This mineral is arsenide of nickel, and contains from 35 to 45 per cent. of the metal. It is found in Norway, Germany, Hungary, France, and the United States. It is abundant in some districts of South America, and sometimes is found in Cornwall. *Magnetic pyrites* or *pyrrhotite*, a compound of iron and sulphur, often contains from 3 to 5 per cent. of nickel. When it does so it is used as an ore of that metal. It has been largely smelted for nickel at New Jersey, and a nickeliferous ore of this kind is now found plentifully in Norway. *Nickel glance* is a compound of nickel with arsenic and sulphur, in which the percentage of nickel varies from 25 to 35 per cent. It is found in Sweden, in the Harz, in Thuringia, and one or two other places. *Pentlandite* is a sulphide of iron and nickel, found in Norway and in Argyllshire. It has from 14 to 20 per cent. of nickel. *Millerite*, a sulphide of nickel, rich in the metal, is found in Lancaster county, Pennsylvania. *Ullmanite* is a compound of sulphur, antimony, and nickel; and *Annabergite* is an arseniate of nickel. *Garnierite* is an ore of nickel, which was first discovered about 1874 in New Caledonia, and is now the most important source of the metal. It is a hydrosilicate of magnesia and nickel, and contains on an average from 7 to 10 per cent. of the latter. Its value as an ore is increased by the fact that it is without either arsenic or sulphur. Large quantities of it have been shipped to England and France, and in some years the total production of the island amounted to 12,000 tons, representing 850 tons of nickel. An ore similar to that from New Caledonia has been discovered in Oregon and in North Carolina, apparently in rich deposits in the former state. Discoveries of nickel ore have also been made in Texas and Nevada. Extensive deposits of mixed nickeliferous pyrrhotite and copper pyrites have within the last four years been found in Canada (Sudbury district), and some are now being vigorously worked. Kupfer-nickel or nickeline and a rich amorphous nickel ore are known to occur on Michipicoton Island. The nickel ore raised in Canada in 1888 amounted to 1,220,000 lb.

Nickel is not found separately in the native state, but it is always present in meteoric iron. Cobalt is very frequently associated with nickel in ores. In the smelting of arsenical ores the product obtained in the first instance is called speiss, but in one smelting operation regulus, metal, and slag may be obtained as well as speiss. Nickel speiss is a mixture chiefly of the arsenides and sulphides of nickel, iron, and copper, left as a residue in the pot used in the preparation of Smalt (q.v.), from complex arseniferous nickel and cobalt ores previously roasted. In this process the cobalt practically all passes into the blue glass of which smalt consists.

Smelting.—At the older nickel-works in different parts of Europe much of the nickel produced is extracted from speiss or from regulus, in either of which the metal has become concentrated, and may amount to from 30 to 60 per cent. A good deal of secrecy has been observed regarding the smelting of nickel, but accounts of some of the processes in use have been published. Briefly stated, one of

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these consists in removing by suitable methods the metals other than nickel in the speise, in getting rid of the arsenic by forming an alkaline arsenite which is soluble in water, and in obtaining a sulphide of nickel which is usually mixed with a small quantity of cobalt. This sulphide when boiled with sulphuric acid yields sulphate of nickel, from which potash precipitates the hydrated oxide mixed with a little cobalt. The separation of the oxides of nickel and cobalt is effected by dissolving the mixture of them in an acid, neutralising, and adding a slight excess of nitrite of potassium and acetic acid. After a few hours the double nitrite of cobalt and potassium is deposited, while the filtered liquid contains only the nickel. Its hydrate is precipitated by caustic potash and redissolved in oxalic acid. When the oxalate of nickel is heated in a wind-furnace fused metallic nickel is obtained.

The New Caledonia ore (garnierite) is smelted by one process in this way. It is placed along with limestone and coke or charcoal in a furnace about 16 feet high with tuyères. Here a regulus is produced with 60 or 70 per cent. of nickel, and containing also some iron, some carbon, and sometimes a little sulphur. This is manipulated in a Siemens' furnace to remove the iron, and also sulphur if present, and the nickel is then refined with oxide of manganese and alkaline flux in a plumbago crucible.

Oxides of Nickel.—These are nickel monoxide, NiO, the hydrate of this oxide, $Ni(OH)_2$—both of which are green—and nickel sesquioxide, Ni_2O_3, which is a black powder. The monoxide of nickel is used to give a soft brown colour to pottery.

Salts of Nickel.—Of these Roscoe and Schorlemmer, in their *Treatise on Chemistry*, say they are derived from the monoxide. In the anhydrous condition they are usually yellow-coloured, whilst in the hydrated state and combined with colourless acids they possess an apple-green to an emerald-green colour. The soluble normal salts have a slightly acid reaction and a sweetish, astringent, metallic taste, and act as emetics.

Nicker (A.S. *nicor*, pl. *niceras*, in *Beowulf*), a malignant kind of water-sprite in Teutonic mythology. He often presents himself on the shore in the shape of a horse, and has thus close affinities with the Scotch *kelpie;* while indeed the Old Norse *nikr* (Old High Ger. *nichus*) is thought by some to mean the hippopotamus only. In our own demonology we find both a male *nix* and a female *nixie*. The modern Dutch *nikker* is merely an ordinary evil spirit or devil, recalling our own familiar *Old Nick*.

Nicobar Islands, a group of islands in the Indian Ocean, forming with the Andamans, to the south of which group they lie, an extension of the great island chain of which Java and Sumatra are the principal links. Just a score in number, of which twelve are inhabited, they consist of two divisions—the northern, low and planted with cocoa-nut trees, and the southern, mountainous (2000 feet) and covered with timber. Malaria prevails nearly all the year round; the temperature seldom moves outside the limits 80°–85° F. The people belong to two races, an inland tribe, little civilised, who show Mongolian affinities and are regarded as indigenous, and the coast people, about 6000 in number, who are of mixed Malay blood, but idle and lazy. They collect and export trepang and edible birds'-nests. The archipelago was occupied by Denmark from 1756 to 1856. In 1869 it was annexed by Britain, to put a stop to the piracy of the people. A penal colony for India exists at Nankauri on the island Kamorta (see map at BURMA).

Nicolai, CHRISTOPH FRIEDRICH, author, bookseller, and publisher, was born 18th March 1733, at Berlin, where his father was also a bookseller. He early distinguished himself by a series of critical letters (1756), in which he exposed the errors of both Gottsched and Bodmer, then carrying on a controversy which was agitating the literary world of Germany. With Moses Mendelssohn he edited the *Bibliothek der schönen Wissenschaften* (1757–58), and contributed with Lessing to *Briefe die neueste deutsche Literatur betreffend* (1759–65). By this he was led to conceive the plan of the *Allgemeine deutsche Bibliothek* (106 vols. 1765–92), a periodical which he edited for many years, and which contributed to the progress of literature and improvement of taste in Germany, but became ridiculous from the inability of its editor to appreciate the new spirit that was stirring in Herder, Goethe, Schiller, Kant, and others, with all of whom he was at feud. He wrote topographical works, satires, anecdotes of Frederick the Great, and an autobiography, in which he describes strange apparitions or obvious hallucinations by which he was visited. He died 8th January 1811.

Nicolai, OTTO, musical composer, born at Königsberg, 9th June 1810. His early life was a struggle with poverty and difficulties. He studied in Berlin and in Rome, and in 1847 became Kapellmeister at Berlin. His best-known work is the opera *The Merry Wives of Windsor* (1848). He died 11th May 1849.

Nicolaitans, an immoral sect mentioned in Rev. ii. 6, 15, and sometimes, but apparently on very feeble grounds, connected with Nicolas the proselyte of Antioch, mentioned in Acts, vi. 5. Indeed the name seems rather to be symbolic than historical, the Greek *Nikolaos* being an equivalent to the Hebrew *Balaam*. In this sense the passage in the Apocalypse harmonises closely with what is said of the followers of Balaam in Jude and 2 Peter, and Rev. ii. 15 need not be taken as referring to a different class from verse 14. Their error was a licentiousness which they brought into the Christian church from the heathen world, and the subtler wickedness of defending this as supported by a doctrine and a prophetic illumination (2 Pet. ii. 1). There is no satisfactory evidence of the existence of such a sect after the time of John; still Irenæus mentions the Nicolaitans as a sect of Gnostics of the Ophite class, and in this he is followed by Hippolytus.

Nicolas, ST, the patron saint of Russia, whose life is wrapped in an obscurity that is but little lightened by fable. He was bishop of Myra in Lycia, and according to Metaphrastes was imprisoned under Diocletian and released under Constantine. The statement that he was present at the Council of Nice is in the highest degree improbable. His supposed relics were conveyed from the East to Bari, in the kingdom of Naples, on 9th May 1087; and it is a curious fact that in the Russian Church the anniversary of this translation is still observed as a festival. In Catholic countries St Nicolas is especially the patron of the young, and particularly of scholars. In England his feast was celebrated in ancient times with great solemnity in the public schools, Eton, Sarum Cathedral, and elsewhere; and still in Germany on the vigil of his feast, which is held on the 6th December, a person in the appearance and costume of a bishop assembles the children of a family or of a school, and distributes among them, to the good children, gilt nuts, sweetmeats, and other little presents, as the reward of good conduct; to the naughty ones, the redoubtable punishment of the 'Klaubauf.' *Santa Claus* is a corruption of the name, introduced into England from America; the old Dutch settlers of New York kept a San Claus holiday. St Nicolas was also the patron of merchants, sailors, and travellers; and as he was prayed

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to for protection against robbers, the term 'Clerks of St Nicolas' came, oddly enough, to be a cant name for robbers.

Nicolas, Sir Nicholas Harris, antiquary, was born 10th March 1799, of a Cornish family of Breton origin. He entered the navy, and had reached the rank of lieutenant by 1815, but at the close of the war left the service to study law, and was called to the bar at the Inner Temple in 1825. He devoted himself chiefly to genealogical and historical studies, and his great work, the *History of the Orders of Knighthood of the British Empire* (4 vols. 1841–42), remains a solid monument of learning. Harris was made K.H. in 1831, and K.C.M.G. in 1840, and died at Cape Curé, near Boulogne, August 3, 1848. He devoted the energies of his later years to works on the naval history of England: *Dispatches and Letters of Admiral Lord Viscount Nelson* (7 vols. 1844–46), and the unfinished *History of the British Navy* (2 vols. 1847), as well as the papers of Sir Hudson Lowe. Harris wrote biographical notices of many of the poets in Pickering's Aldine edition, as well as many useful historical handbooks, as a *Synopsis of the Peerage of England* (1825), *Testamenta Vetusta* (1826), the *Chronology of History* (1835). Other works are *Proceedings and Ordinances of the Privy Council of England* (7 vols. 1833–37); a *Life of William Davison*, Queen Elizabeth's secretary and scapegoat in the execution of Mary, and an ancestor of his wife's (1823); *Memoirs of Ritson* (1833); and a host of books and papers—and all of value—on heraldic, genealogical, antiquarian, and historical questions. A list of these is given in the *Gentleman's Magazine* for October 1848.

Nicole, Pierre (1625–95), one of the most distinguished of the Port Royalists (see Port Royal), the friend of Arnauld and Pascal. See also Jansen.

Nicoll, Robert, minor Scottish poet, was born the son of a small struggling farmer at Little Tullybeltane, in the Perthshire parish of Auchtergaven, 7th January 1814. He was four years a grocer's apprentice at Perth, next opened a circulating library in Dundee, and here took to writing for the newspapers, and published a volume of *Songs and Lyrics* (1835). In 1836 he became editor at a salary of £100 of an ultra-radical weekly, the *Leeds Times*, but worked too zealously for his health, and gave himself his death-blow by his exertions in the victorious contest of Sir William Molesworth with Sir John Beckett in the summer of 1837. He went north for rest, only to die of consumption at Trinity, near Edinburgh, 7th December 1837. He was buried in North Leith Churchyard. Beyond a doubt Nicoll was a genuine poet, and moreover it must ever be remembered that he died at twenty-three. But it is far more from their intrinsic value than the mere pathos of his story that his countrymen remember such poems as 'We are Brethren a',' 'Thoughts of Heaven,' and 'The Dew is on the Summer's Greenest Grass.'

See the Life by Mrs Johnstone, first prefixed to the 1842 edition of the poems; that prefixed to the Paisley edition (1877); and the somewhat uncritical life, by P. R. Drummond (published posthumously, 1884).

Nicomedia, the capital of ancient Bithynia, situated at the north-eastern angle of an inlet of the Propontis, was built in 264 A.D. by Nicomedes I. It soon became one of the most magnificent and flourishing cities in the world, and some of the later Roman emperors, such as Diocletian and Constantine the Great, selected it for their temporary residence. It suffered greatly from earthquakes. Hannibal committed suicide in a castle close by, and Constantine died near the city, which was the birthplace of the historian Arrian. The small town of Ismid now occupies its site. See Bithynia for Nicomedes.

Nicopolis, a town of Bulgaria, with 4652 inhabitants, is on the Danube, 56 miles W. of Rustchuk. The Berlin Congress of 1878 provided for the demolition of the fortifications. Here the Hungarians were defeated by the Sultan Bajazet in 1396; and the place has been more than once taken by the Russians (1810, 1827, 1877).

Nicosia, (1) called also Levkosia, the capital of Cyprus, situated near the middle of the northern half of the island, is surrounded with old Venetian walls, and is the residence of the British High Commissioner, and the see of a Greek archbishop. There are numerous mosques and churches, and some manufactures of silk, leather, and cotton. Pop. 11,536.—(2) A city of Sicily, 40 miles NW. of Catania. Pop. 14,941.

Nicot, Jean, born at Nîmes in 1530, died at Paris in 1600, French ambassador at Lisbon, introduced into France the tobacco-plant, which was called after him *Nicotiana* (see Tobacco). He also compiled one of the first French dictionaries, *Trésor de la Langue Françoise* (1606).

Nicotine, $C_{10}H_{14}N_2$, is a volatile liquid alkaloid, and constitutes the active principle of the tobacco-plant, in all parts of which it occurs in combination with malic and citric acids. It is likewise contained in minute amount in the smoke of the burning leaves. When pure and freshly prepared it is a colourless, intensely poisonous liquid, which evolves a very irritating odour of tobacco, but on exposure to the air it rapidly oxidises and becomes brown in colour. It is moderately soluble in water, and dissolves readily in alcohol and ether. The quantity of nicotine in tobacco varies from 2 to 8 per cent.; the coarser kinds contain the larger quantity, while the best Havana cigars seldom have more than 2 per cent., and often less. Locally, nicotine is very irritating. Taken internally, it is one of the most powerful poisons known; $\frac{1}{60}$ grain taken by the mouth has caused in man distinct symptoms of poisoning, there being first seen a short stage of excitement, followed by headache, vertigo, great weakness, and general depression. Larger doses ($\frac{1}{15}$ grain) caused in addition trembling, vomiting, collapse, and great depression of the heart and respiration. A single drop is sufficient to kill a rabbit or cat in a few minutes. It has been used rarely for homicidal and suicidal purposes, but the minimum lethal dose in man is not accurately known.

Nictitating Membrane, or Third Eyelid. See Bird, and Eye.

Nidderdale, the valley of the river Nidd, which rises at the foot of Whernside, in Yorkshire, and flows south-east and east, and joins the Ouse a few miles above York. The upper portion of the stream flows through picturesque scenery, and past Ramsgill, the birthplace of Eugene Aram. Above Lofthouse it disappears underground for about two miles. See Joseph Lucas's *Studies in Nidderdale* (1882).

Niebelungen. See Nibelungen.

Niebuhr, Barthold Georg, one of the most distinguished of modern historians, was born August 27, 1776, at Copenhagen, the son of the famous traveller, Karsten Niebuhr. From his infancy he showed unusual promise, and he was carefully educated under his father's eye. After his studies at Kiel he became private secretary to Count Schimmelmann in Copenhagen, and devoted himself to the study of the natural sciences at London and Edinburgh (1798–99). In 1800 he married and entered the Danish state-service, and

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held various appointments, which he resigned in 1806 to enter the Prussian civil service on the invitation of Stein. During the next three years, the darkest in the history of Prussia, Niebuhr was actively employed in public business and in various secret financial missions. But his scholar's temperament was but ill adapted for political intrigue, and the opening of the university of Berlin in 1810 proved a new era in his life. He gave (1810–12) a course of lectures on Roman history which, by making known the results of the new and critical theory that he had applied to the elucidation of obscure historical evidence, established his position as one of the most original and philosophical of modern historians. His appointment, in 1816, to the post of Prussian ambassador at the papal court, where he remained till 1823, gave him an opportunity of testing on the spot the accuracy of his conjectures in regard to many questions of local and social bearing. On his return from Rome Niebuhr took up his residence at Bonn, where his admirable lectures gave a powerful impetus to classical and archæological learning. He was thus employed when the revolution of 1830 roused him from the calm of his literary pursuits. His sensitive nature, unstrung by physical weakness, led him to take an exaggerated view of the consequences of this movement, and to anticipate a recurrence of all the horrors of the former French revolution, and the result was to bring about a state of mental depression and bodily prostration, which ended in his death, 2d January 1831.

Niebuhr's attainments were of extraordinary range, and his genius strikingly original in cast. He had mastered twenty languages before the age of thirty, and his tenacious memory retained everything he read; while he possessed in a remarkable degree the gift of intuitive sagacity that enabled him to sift true from false historic evidence, and often to supply by felicitous conjecture the link wanting in some imperfect chain of evidence. It is not to be denied, however, that his scepticism as to the credibility of early history goes too far, and that he is often arbitrary and unhistorical in his conjectures; indeed, the stricter sort of sceptical critics, like the late Sir George Cornewall Lewis, go so far as to regard his effort to construct a continuous Roman history out of such legendary materials as we possess as, on the whole, a failure. Niebuhr's theory of the construction of the earlier Roman history from still earlier ballads is not now accepted by scholars; but the fact remains that the bulk of his contribution to history still stands substantially unshaken, and it would be difficult to overestimate the strength of the impetus he gave to its study on a really scientific method.

Of his *Römische Geschichte* (vols. i. and ii. 1811–12; 2d ed. 1827–28; vol. iii., coming down to end of first Punic war, edited from his papers by Classen, 1832) the first two volumes were translated by Julius Hare and Connop Thirlwall, and the third by Dr W. Smith and Dr L. Schmitz; other works translated by Schmitz into English are *Lectures on the Hist. of Rome, to Fall of Western Empire* (2d ed. 3 vols. 1850), *Lectures on Ancient Hist.* (3 vols. 1852), and *Lectures on Ancient Ethnography and Geog.* (2 vols. 1853). Other works are *Griech. Heroengeschichte* (1842), written for his son Marcus; *Kleine historischen und philologischen Schriften* (2 vols. 1828–43); besides numerous other essays on philological, historical, and archæological questions. Niebuhr co-operated with Bekker and others in re-editing *Scriptores Historiæ Byzantinæ;* he also discovered hitherto unprinted fragments of classical authors, as of Cicero's *Orations* and portions of Gaius; published the *Inscriptiones Nubienses* (Rome, 1821); and was a constant contributor to the literary journals of Germany. See Madame Hensler's *Lebensnachrichten* (1838; Eng. trans. by Miss Winkworth, 3 vols. 1852), and the studies by Classen (1876) and Eyssenhardt (1886).

Niebuhr, KARSTEN, a distinguished geographer and traveller, was born in 1733, in the Hanoverian territory of Hadeln. He spent several years as a day-labourer; but having acquired a small property, he studied at Göttingen, entered the Danish service, and in 1761 joined an expedition to explore portions of Arabia, Persia, Asiatic Turkey, and India. On his return to Denmark in 1767 he published the results of his mission, *Beschreibung von Arabien* (Copenhagen, 1772), and *Reisebeschreibung* (3 vols. 1774–98). He also edited and published at his own cost the natural history notes of his deceased friend and fellow-traveller, P. Forskäl, *Descriptiones Animalium* (1775) and *Flora Ægyptiaco-Arabica* (1776). He accepted in 1778 a civil post at Meldorf, in the Ditmarsh district of Holstein, then Danish. He died 26th April 1815. See his son's *Leben Niebuhrs* (1817).

Niederwald, the western termination of the Taunus range, that abuts upon the Rhine over against Bingen. On a commanding site near its summit was erected, on 28th September 1883, the national (German) memorial commemorative of the successful war of 1870–71. An extensive pedestal, ornamented with allegorical figures, is surmounted by a bronze figure of Germania, 34½ feet in height. The whole was designed by Schilling, a Dresden sculptor. Toothed-railways carry visitors up to the monument from the villages of Rüdesheim and Assmannshausen at the foot, both noted for their wine.

Niel, ADOLPHE, French marshal, was born at Muret (Upper Garonne) on 4th October 1802, and entered the army as an engineer officer; he took part in the storming of Constantine in Algeria (1836), the siege of Rome (1849), the bombardment of Bomarsund in Finland (1854), the fall of Sebastopol (1856), and in the battles of Magenta and Solferino (1859). His share in these battles won him the marshal's baton. He was made minister of war in 1867, and was busily employed reorganising the French army when he died, 14th August 1869. It is from him that the favourite Marshal Niel (yellow) rose derives its name.

Niello-work (Ital. *niello*, from Low Lat. *nigellum*, 'black enamel'), a method of ornamenting silver or gold plates by engraving the surface, and filling up the lines with a black composition to give clearness and effect to the incised design. The plates so ornamented were principally employed in the making of church-plate reliquaries, and for costly personal ornament. Traces of the art are found in ancient Roman work, and it was much practised under the Byzantine empire from the 16th century onwards. The Italian goldsmiths attained remarkable skill in niello-work; and the most eminent and famous of these was the Florentine Maso or Tommaso Finiguerra, whose work, in addition to its artistic excellence, derives peculiar interest from the fact that he, being the first to take paper proofs from his engraved work, directly led the way to the production of line-engravings. The name niello is given not only to the engraved and niellated metal-work, but also to the paper proofs taken from them; and as these were only casually taken they are very rare, and bring great prices, as much as 300 guineas having been paid for a single small proof. Niello-work is still practised by goldsmiths, especially in Russia, the silver niellated boxes made in that country being popularly known as 'platina boxes.' See ENGRAVING, Vol. IV. p. 378; and a long article in the *Athenæum* for 27th February 1886 on the extensive fabrication of *nielli* at Venice in the early part of the 19th century.

Niemen, a river of western Russia, whose lower course (70 of its 500 miles) lies within the province of East Prussia, where it is called the

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Memel, rises a few miles south of the city of Minsk. It is navigable to Grodno; below Tilsit it divides into two branches, which reach the Kurisches Haff each by four mouths. For its trade, see TILSIT.

Niepce, JOSEPH NICÉPHORE, one of the inventors of photography, was born at Châlon-sur-Saône, 7th March 1765, served in the army in Italy, and in 1795 became administrator of the district of Nice. Returning to Châlon in 1801, he devoted himself to chemistry, lithography, and to those experiments with sunlight pictures which brought him into connection with Daguerre and made Photography (q.v.) possible. He died 5th July 1833.—His nephew, CLAUDE MARIE FRANÇOIS NIEPCE DE ST VICTOR (1805–70), also a soldier, contributed to the furtherance of the new art, and wrote a *Traité Pratique* (1856) on the subject, and *Recherches Photographiques* (1855).

Nierstein, a village of Hesse-Darmstadt, on the Rhine, 10 miles SSE. of Mainz, famous for its Rhine wine. Pop. 3283.

Nieuwveld Mountains. See CAPE COLONY.

Nièvre, a central department of France, occupies a portion of the watershed between the Loire and the Seine, and is bounded on the west by the rivers Allier and Loire. Area, 2632 sq. m.; pop. (1881) 347,576; (1886) 347,645. Mountains belonging to the Morvan system, which forms the watershed between Seine and Rhone, divide the department into two great declivities. There are plateaus more or less fertile, vine-clad hills, and valleys rich in pastures; but the principal wealth of the department consists in its forests and minerals—coal, iron, and gypsum. The Nièvre, whence the name of the department, is an inconsiderable affluent of the Loire from the right. The three chief rivers—the Allier, Loire, and Yonne—are navigable, and the Yonne, which belongs to the system of the Seine, is connected with the Loire by a canal. More than a third of the whole surface is covered with forests. Good wine is made; the iron industry is important, and pottery and glass are manufactured. Arrondissements, Nevers, Château-Chinon, Clamecy, and Cosne; capital, Nevers.

Niflheim ('the abode of clouds'), in Scandinavian Mythology (q.v.), the kingdom of cold and darkness, separated from Muspelheim, the kingdom of light and heat, by a huge chasm (Ginnungagap). Niflheim was also the abode of Hel (q.v.), the goddess of death.

Nigella, a genus of plants of the natural order Ranunculaceæ, having five coloured spreading sepals; five or ten small two-lipped petals, with tubular claw; the carpels more or less connected together, many-seeded; the leaves divided into threadlike segments, the flowers solitary at the top of the stem or branches. They are annuals, natives chiefly of the countries near the Mediterranean and the warmer temperate parts of Asia. Some of them, occasionally seen in gardens in Britain, are vulgarly known as *Devil-in-a-mist*. The seeds are aromatic and somewhat peppery. Those of *N. sativa*, a species common in cornfields in the south of Europe, are supposed to be the Black Cummin of the ancients, and perhaps the Cummin of the Bible.

Niger, the name now generally applied to one of the most remarkable river-systems of West Equatorial Africa, first appears in Ptolemy as designating, it is believed, the modern Wadi Draa, and coupled with a river Gir, which may be identified with the modern O-Guir, flowing southward from the Atlas towards the oases of Tuat. The word not improbably contains the root *gir*, *gar*, or *jur*, not infrequent in the river-names of northern Africa. Mixed up as it was from time to time with the problem of the Nile, the problem of the Niger remained almost till the 19th century one of the most perplexed and bemuddled in the whole range of geography. Though the Portuguese had ascended the river from the sea in the 16th century, the most contradictory opinions were held as to its character and relations down to the later part of the 18th century: it was an affluent of the Nile; an affluent of the Congo; an independent river terminating in an inland basin; and so on. It was still left to Mungo Park and other workers in the service of the African Association (1788) to lay the basis of our present fairly accurate knowledge of the system. Apart from some of the tributary streams, the hundred years of exploration now leave only a blank of some 60 or 70 miles in the middle course of the main river.

The Niger proper (Joliba or Dhiuliba, Isa, Kworra or Quorra, &c.) has a total length of 2600 miles, and the area of the entire basin (including that of the Benuë) is estimated at 1,023,280 sq. m. The head-waters are situated in the region now known as the States of Samory, inland from Sierra Leone and Liberia, and are contiguous to the head-waters of the Senegal. The Tembi (first explored by Zweifel and Moustier in 1879), rising at a height of about 3000 feet above the sea in the Loma Mountains in 8° 36′ N. lat. and 10° 33′ W. long., is now accepted as the conventional 'source.' This and its sister streams, though draining a comparatively limited area, soon gather into a good navigable river, which holds a north-easterly course as far as Timbuktu (18° 4′ N. lat., 1° 45′ W. long.), first visited by Laing in 1826. About 300 miles above this famous city it is joined by an important right-hand tributary, the Mayel-Balevel, and develops a tendency to split up into numerous and widely diverging channels, with cross-creeks, back-waters, and swamps. Beyond Timbuktu a more easterly direction is maintained for 200 miles, and then with its now united forces the Niger turns south-east to cut its way through a rocky tract of country, and to pass in succession Gao (Gogo) on the southern skirt of the Sahara; Say, the southern point of Barth's exploration; Gompa, the northern limit of Flegel and Thomson; Bussa, where Park came to his untimely end; Rabba, one of the largest cities on its course; and Egga, where the river, having struck across the Rennell Range (2800 feet), turns more to the south. During this long journey from Timbuktu (1130 miles) a chief characteristic of the Niger has been the insignificance of its tributary streams; but at last, in 7° 50′ N. lat. and 6° 45′ E. long., it meets in the Benuë or Mother of Waters a rival both in volume and in beauty. This river has travelled 860 miles from the east; and, though exploration in 1890 has deprived it of the credit (hypothetically assigned) of being a link through the Tuburi swamp with the system of Lake Tsad, it has interest enough, geographical and commercial, of its own. The united river, leaving the sandstone plateau through which it has been carving its channel, 'passes through a series of bold, picturesque hills by a narrow gorge,' and below Onitsha begins to break up into one of the most remarkable mangrove-covered deltas in the world. See Johnson, paper and map, in *Proc. Roy. Geog. Soc.* 1888.

The greater bulk of the exploration of the Niger (especially towards the south) has been accomplished by Britain (Park, Clapperton, Beecroft, Trotter, Baikie, &c.), and thanks mainly to Macgregor Laird, who founded the African Steamship Company in 1832, Britain has held her ground against all foreign commercial competition. By the Berlin Conference of 1884 the whole course of

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the river below Timbuktu (while its navigation is declared free) is placed under the protection of Britain; and the British United African Company (founded 1879, chartered 1886), with its stations at Akasa, Onitsha, Asaba, Lokoja, &c., has practical command of the trade. The English Church Missionary Society has long laboured in the delta region and inland as far as possible; and in 1864 Bishop Crowther was appointed to the bishopric of the Niger. Above Timbuktu the control is in the hands of the French, who have steamers on the river, have built forts at Kouroussa, Siguiri, Kanguba, and Bammako, and are rapidly pushing eastwards. Germany made a strong effort, mainly through Flegel, to seize the control on the Benuë, but was thwarted by the United African Company. For a long time slaves were almost the only article of export from the Niger; at a later date palm-oil became so distinctly the staple that the name Oil Rivers was given to the various outlets of the delta in which the Niger proper interlaces with several seaboard streams. As European influence advances inland the variety of commercial products increases.

See Joseph Thomson, *Mungo Park and the Niger* (1890); *Le Soudan Français*, and Binger, *Du Niger au Golfe de Guinée*, in Bull. de la Soc. de Géog. (1889); and *Die Flegelsche Routenkarte*, in Z. der Ges. für Erdkunde (1889).

Night. See DAY.—Amongst the ancient Greeks Night (*Nyx*) was personified as a powerful goddess, who by means of sleep exercised power over men and gods. According to Hesiod, she was the daughter of Chaos, wife of Erebus, and mother of Aether and Hemera (Day), of the Fates, Sleep, Death, Dreams, Hunger, Fear, Nemesis, and Strife. By day she dwelt in Tartarus, enveloped in thick clouds.

Night-hawk, the usual name in the United States for the *Chordeiles popetue*, a goatsucker belonging to a different genus and species of the Caprimulgidæ from the European Goatsucker (q.v.). It is found over nearly the whole of North America, has long, thin, pointed wings, a forked tail, a very small beak, and wide gaping mouth, furnished with bristles.

Night-heron (*Nycticorax*), one of the genera of Herodiones (see HERON), cosmopolitan in its distribution, and including nine species. One species, *N. griseus*, widely distributed over the whole of Africa and southern Asia, breeding in the Spanish peninsula and in Italy, and a migrant to places near the Baltic, has now, since the year 1872 when it was first recorded near London, become an almost annual visitor to various parts of the British Islands in spring and autumn, and would probably breed if unmolested. It is about 23 inches long; it nests in colonies on trees or bushes in swamps, or on reeds strongly built together in a pile, and feeds on water insects and their larvæ, worms, snails, small fish, and frogs. Closely allied forms inhabit America, the *N. nævius* (*Nyctiardea Gardeni*, Baird), the common American night-heron, being found all over the United States, as a permanent resident in the southern portion only; and in the Malayo-Australian region *N. caledonicus*, a distinct species, occurs.

Nightingale (*Daulias*) a genus of Passerine birds of the family Turdidæ. The bill is straight, slender, not quite as long as the head; the wings do not much pass beyond the base of the tail; the first quill is very short, the third is the longest; the tail is slightly rounded; toes long, claws rather short. The Common Nightingale (*D. luscinia*) is well known as the finest of songsters. It is rather larger than the hedge-sparrow, with about the same proportionate length of wings and tail. It is of a rich russet-brown colour above, shading into reddish chestnut on the tail-coverts and tail; the lower part grayish white; bill, legs, and feet brown. The sexes are alike in plumage. It is a native of many parts of Europe and Asia, and of the north of Africa, extending as far as to Abyssinia, and to the Gold Coast in West Africa, and is a bird of passage, extending its summer migrations on the continent of Europe as far north as the south of Sweden, though in Britain it has scarcely ever been seen farther north than Yorkshire. It is plentiful in some parts of the south and east of England, but is less common in the western counties, and does not visit Scotland, Ireland, or Wales, except Glamorganshire and Brecon. It frequents thickets and hedges and damp meadows near streams. The market-gardens near London are among its favourite haunts. It feeds very much on worms, beetles, insects, ants' eggs, caterpillars and other insect larvæ. It arrives in England about the middle of April, the males about ten days before the females. It is at this season, and before pairing has taken place, that bird-catchers generally procure nightingales for cage-birds, as they then become easily reconciled to confinement, whilst if taken after pairing they fret and pine till they die. If nightingales, however, are to be kept in confinement they ought to be taken from the nest when young and reared by the hand. The nightingale makes its nest generally on the ground, but sometimes on a low fork of a bush. The nest is loosely constructed of dead leaves, rushes, and stalks of grass, with a lining of fibrous roots. The eggs are from four to six in number, of a uniform deep olive-brown. The song of the male ceases to be heard as soon as incubation is over. In captivity, however, it is often continued through a more considerable period. The nightingale usually begins its song in the evening, and sings with brief intervals throughout the night. The variety, loudness, and richness of its notes are equally extraordinary; and its long quivering strains are full of plaintiveness as well as of passionate ecstasy. The nightingale has been a favourite from most ancient times, and is often mentioned in the poetry of India and Persia, of Greece and Rome, as well as by Shakespeare and Herrick, Keats and Coleridge, and many others. The loves of the Bulbul (q.v.) and the rose are a fanciful theme in which eastern poets delight. The nightingale, as a rule, is not a shy bird, for although it is but seldom seen it seems to prefer to live near the abode of man; nor is it quarrelsome with others of its own species except at pairing time. A closely allied species (*D. golzii*) is found from the Caucasus to Turkestan and Persia, and in north-eastern and central Europe the Northern Nightingale or 'Sprosser' (*D. philomela*) is found, quite a

Common Nightingale (*Daulias luscinia*).

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distinct species, of rather larger size, less russet in hue, and slightly spotted on the breast.

Nightingale, FLORENCE, the daughter of William Edward Nightingale of Embley Park, Hampshire, and Lea Hurst, Derbyshire, was born at Florence in May 1829. She was taught mathematics, the classics, and modern languages under the guidance of her father, and thus highly educated and brilliantly accomplished she early exhibited an intense devotion to the alleviation of suffering, which in 1844 led her to give attention to the condition of hospitals. She visited and inspected civil and military hospitals all over Europe; and in 1851 went into training as a nurse in the institution of Protestant Deaconesses at Kaiserswerth on the Rhine, and studied with the Sisters of St Vincent de Paul in Paris the system of nursing and management carried out in the hospitals of that city. On her return to England she put into thorough working order the Sanatorium for Governesses in Harley Street. Ten years was the term of apprenticeship thus served in preparation for the work of her life. In the spring of 1854 war was declared with Russia; Alma was fought on the 20th of September, and the wounded from the battle were sent down to the hospitals on the Bosporus, which were soon crowded with sick and wounded, their unhealthy condition becoming apparent in a rate of mortality to which the casualties of the fiercest battle were as nothing. In this crisis Miss Nightingale wrote on 15th October and offered to go out and organise a nursing department at Scutari. Lord Herbert, who had already written a letter 'requesting' her to go, which crossed that containing Miss Nightingale's offer, gladly accepted, and on the 21st of October she departed with thirty-four nurses. She arrived at Constantinople on the 4th of November, the eve of Inkermann—the beginning of the terrible winter campaign—in time to receive the wounded from that second battle into wards already filled with 2300 patients. Her devotion to the sufferers can never be forgotten. She would stand twenty hours at a stretch, in order to see them provided with accommodation and all the requisites of their condition, and a few months after her arrival she had 10,000 sick men under her care. But she saw clearly in the bad sanitary arrangements of the hospitals the causes of their frightful mortality, and her incessant labour was devoted to the removal of these causes, as well as to the mitigation of their effects. In the spring of 1855, while in the Crimea organising the nursing departments of the camp-hospitals, she was prostrated with fever, the result of unintermitting toil and anxiety; yet she refused to leave her post, and on her recovery remained at Scutari till Turkey was evacuated by the British, July 28, 1856. She, to whom many a soldier owed life and health, had expended her own health in the physical and mental strain to which she had subjected herself. In 1857 she furnished the 'commissioners appointed to inquire into the regulations affecting the sanitary condition of the British army' with a paper of written evidence, in which she impresses forcibly and clearly the great lesson of the Crimean war, which she characterises as a sanitary experiment on a colossal scale. At the close of the Crimean war a fund of £50,000 was subscribed for the purpose of enabling her to form an institution for the training of nurses; this is spent in training a superior order of nurses in connection with St Thomas's (the Nightingale Home) and at King's College Hospital. From the Queen she received an autograph letter of thanks, and a cross set with diamonds, as also a bracelet set with brilliants from the Sultan of Turkey. Her experience in the Crimea turned the attention of Miss Nightingale to the general question of army sanitary reform, and first to that of army hospitals. In 1858 she published her valuable *Notes on Nursing*, and she contributed two papers to the National Association for the Promotion of Social Science, on Hospital Construction and Arrangement. The *Notes on Hospitals* (1859), from their clearness of arrangement and minuteness of detail, are most valuable to the architect, the engineer, and the medical officer. In the year 1863 was issued the Report of the Commission on the Sanitary Condition of the Army in India. These reports were sent in manuscript to Miss Nightingale, and at page 347 of vol. i. are inserted her incisive and admirable observations upon this immense mass of evidence. In 1871 Miss Nightingale published *Notes on Lying-in-Institutions;* in 1873, *Life or Death in India* and (in *Fraser's Magazine*) 'A "Note" of Interrogation,' which attracted a good deal of attention, mainly on account of the way she handles religious beliefs and life. From America and from different European governments her advice has been sought as to army sanitation; she assisted in founding the Red Cross Society. Longfellow's *Santa Filomena* is in her praise. The article HOSPITALS in this Encyclopædia is from her pen.

Night-jar. See GOATSUCKER.

Nightmare (A.S. *neaht*, 'night,' and *mara*, 'night-mare;' originally 'the crusher'). See DREAMING.

Nightshade, the English name of certain plants of the natural order Solanaceæ (q.v.), possessing the narcotic properties frequently developed in that order. Among them are some species of Solanum (q.v.), particularly the Common Nightshade, or Black Nightshade (*S. nigrum*), an annual or biennial, with erect angular stem, ovate, sinuate-dentate leaves, drooping lateral umbels of white flowers, and globose black berries; a frequent weed in waste places in England and in most parts of the world. Few plants are more widely diffused. It is only slightly narcotic. The leaves in a fresh state are said to be injurious to animals which eat them, but seem to lose almost all narcotic property by boiling, and are used as spinach, particularly in warm climates. The berries, although generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger. They contain, however, the alkaloid *Solanine*, found also in the shoots of the potato. For the Woody Nightshade, see BITTERSWEET; for the Deadly Nightshade, see BELLADONNA; and for Enchanter's Nightshade, see CIRCÆA.

Common or Black Nightshade (*Solanum nigrum*).

Nigritia. See SOUDAN.

Niigata, a seaport of western Japan, situated on a narrow strip of land at the mouth of the Shinano River, was opened to foreign trade in 1859. The harbour does not admit of the entrance of vessels of foreign build, and the roadstead is exposed; the foreign trade has therefore remained

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only nominal. The apples and water-melons of the province are noted for their excellence. Pop. (1889) 40,778.

Nihilism is a term used to describe certain *negative* systems of philosophy. It was applied to some rationalists in the 12th century (Peter Lombard, q.v.), and in modern times to various negative systems of metaphysics, ethics, and atheist philosophy. Of late, however, it has become familiar as applied to Russian revolutionists, and especially (though improperly) to those of the 'terrorist' wing. In Russian life it was first introduced by Turgenief (q.v.), in *Fathers and Sons* (1862), to characterise a new type appearing at that time among the Russian educated classes—men who, in Turgenief's own words, 'bow before no authority of any kind, and accept on faith no principle, whatever veneration surround it.' Accordingly, they defied 'the fathers' 'to find out, in our present life, family and social, one single institution which would not deserve an absolute and pitiless negation;' and, 'abandoning all talk about art, unconscious artistic creation, parliamentarism, reformed tribunals, and what not else,' they put above all 'the question of daily bread for all,' repudiated art as long as it is not in the service of the masses, waged war against prejudices, and reformed their own lives according to truth and sincerity, assuming an outward roughness in their behaviour as a protest against the polished and insincere relations in civilised life. Turgenief's eminently objective description of the new type having been misunderstood, Tchernyshevsky (q.v.) wrote the novel *What is to be done?* representing the Nihilists not as simple philosophers of negation, but as people engaged either in science, or in social reforms on Robert Owen's lines, or (a few of them) as popular revolutionists; and especially insisting upon their highly respectful relations to woman, whom they consider as an intellectually equal comrade in work. The two novels, both drawn from life, thus complete one another, and give a correct idea of Nihilism, which in its philosophical aspects is an outcome of the philosophy of the 18th century as modified by modern science (Buckle, Darwin, H. Spencer, and J. S. Mill being the most popular authors among Nihilists), while in social life it appears as a protest against 'the conventional lies of civilised mankind.' Nihilism is thus the Russian equivalent of the 18th century's Scottish and French Encyclopædist philosophical movements; but it differs from them by having transported their philosophical conceptions into everyday life. The teachings of Nihilism, which has its roots in all previous life of the Russian educated classes (Pushkin was already nicknamed Nihilist by his adversaries), found two very gifted expounders in the art-critic Dobroluboff (1836–61) and the political writer Pisareff (died 1872), and has created a very bulky literature, especially of novels propagating the same ideas. They have exercised a deep influence upon the life of the educated classes in Russia, and created in Russian literature and art a current which makes them differ so widely from literature and art in western Europe. They also contributed to the deep-reaching movement in favour of the higher education of Russian women, which, notwithstanding the opposition of government, is now further advanced in Russia than in any European country. The 324 non-classical gymnasia for girls—quite equal to the best institutions of the same kind—have now 90,000 pupils. Four women's universities and one medical academy, all supported by private contributions and quite equal to the best male universities, had an aggregate of 2000 students when closed by government in 1886–88 (one is reopened); besides, 830 ladies already have obtained doctors' degrees in Russia after having passed the same examinations as the male doctors.

'Nihilists' are now found in all classes of educated Russians, the great bulk taking no part whatever in the political struggle; while those revolutionists who are described in western Europe as Nihilists have political programmes directly borrowed from western Europe, and are known in Russia as Radicals, Socialists, Anarchists, Popularists, or Party of the Will of the People (the latter resorting to political terror in order to obtain a constitution).

The name of Nihilist has, however, been so much identified with the revolutionary movement in Russia that a brief account of the latter must be given under this heading. It was born, especially under the influence of Herzen (q.v.) about 1860, when the hopes of thorough reforms awakened by the proposed emancipation of the serfs were frustrated by the ascendency acquired by the serf-owners' party in the councils of the czar. Proclamations appealing to the peasants to revolt were issued in 1861; and two secret societies—'The Great Russian' and 'Land and Liberty'—were organised. In 1861 the poet Mikhailoff (died in Siberia in 1867) and in 1864 Tchernyshevsky (died in 1887 at Astrakhan, after 20 years' confinement in Siberia) and several others were sent to hard labour in Siberia in connection with this movement. When, after the Polish insurrection (1863), the old party took the upper hand in the Winter Palace, new revolutionary circles made their appearance; they resulted in a peasants' outbreak at Kazan (1864), a revolutionary propaganda among workers, and an attempt by Karakozoff upon the life of the czar (1866). In 1870 a similar movement was started among the youth under the leadership of Netchaieff. The failure of these two movements led to the appearance all over Russia of circles for more serious self-education, which, however, soon took a more revolutionary character, chiefly under the influence of the powerful agitator, Michael Bakunin (q.v.), the ideas of the International Working-men's Association, which rapidly spread in Russia after the Paris Commune, and the socialist writings of Colonel Peter Lavroff. Young men and women of rich families abandoned their homes, and went to the villages and factories in the capacity of workers, schoolmasters in villages, medical helps, midwives, and so on, either simply to share with the people their life of privation or to carry on a revolutionary propaganda. More than 2000 persons were arrested (1873–76) in connection with the movement and kept for years in prison; but only 193 could be brought (end of 1877) before a supreme court. It could not but acquit most of them; yet even then they were sent into exile. Several smaller groups were tried and condemned during the same years.

The flogging of a prisoner in the St Petersburg prison by the then prefect of police, General Trépoff—a most influential person among the advisers of the czar—and the impossibility of otherwise bringing the fact to publicity, induced Vera Zasulitch to make an attempt upon General Trépoff's life (February 1878). She was sent as a common-law offender before a jury and acquitted (April 1878), the attempt at rearresting her as she left the court being baffled by a riot in the streets, during which one of her friends was shot. The trials for political offences were now withdrawn from the senate (which formerly used to judge them) and assigned to courts-martial; while on the other side the revolutionists, abandoning more and more the propaganda among the people, resorted to a policy of terror. They killed several spies, one police official, the governor-general of Kharkoff, and the chief of the state police, General Mezentsoff, in broad daylight in St Petersburg (August 1878).

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Russia was then divided into general governorships, the governors receiving the power of confirming the sentences of death pronounced by the courts-martial, and freely using it. Several attempts against the life of the czar were made: by Solovioff (in April 1879), twice by wrecking imperial trains (November 1879), and finally by a destructive explosion in the Winter Palace (February 1880). Seventeen revolutionists were hanged and hundreds exiled to Siberia during the same twelve months. After the Winter Palace explosion Alexander II., who already more and more abandoned the direction of state affairs, nominated Count Loris-Mélikoff president of a supreme commission for the management of the affairs of the state. Wide promises of constitutional reforms were circulated by the new ruler, but none of them were realised, and the nomination was cancelled a few months later. So the executive committee of the party of the 'Will of the People,' which had at that time very wide ramifications over Russia, and whose secret press always reappeared in spite of the seizure of its printing-offices, prosecuted its underground work, and Alexander II. was killed by bombs March 13, 1881, on the morning of which very day he had signed the convocation of what he himself described as the Assemblée des Notables. The new czar, Alexander III., after a six weeks' hesitation, dismissed his father's ministers and proclaimed his resolution to remain an absolute sovereign. He lives almost a prisoner in Paul I.'s palace at Gatchina, and fresh plots continue to be discovered, spreading also into the army and navy. On March 13, 1887, revolutionists bearing bombs were arrested in a street a few minutes before the passage of the czar. Public discontent finds a new force in the systematic demolition of the reforms of the last reign which is now prosecuted, and it penetrates among the peasants, who see in the abolition of the justices of peace (1889) and the restrictions imposed upon the provincial self-government so many steps towards the reintroduction of the manorial justice of the nobles, and who met these measures by a series of outbreaks in 1889–90.

See G. B. Arnaudo, *Il Nihilismo* (Turin, 1879; also trans. into French); S. Stepniak, *Underground Russia* (1883); *Geschichte der revolutiondren Bewegungen in Russland*, an elaborate work by A. Thun (1883); *Almanac of the Will of the People* for 1883 (published at Geneva in Russian, contains all the names and dates, and an historical sketch of the movement); Stepniak, *Russia under the Tsars* (1885); E. Noble, *The Russian Revolt* (1885); 'Russia and the Siberian Exiles' (*Century Magazine*, December 1887 to November 1889), by George Kennan; P. Kropotkin, 'The Russian Revolutionary Party' (*Fort. Review*, March 1882), and *In Russian and French Prisons* (1887).

Nijni-Novgorod ('Lower Novgorod'), a famous commercial city of Russia, and capital of a government, is situated at the confluence of the Oka with the Volga, 274 miles E. of Moscow by rail. There is an upper city, containing the Kreml and many of the fifty churches, a lower city, and a suburb. The great fair brings buyers and sellers from all climes between Germany and China. For the convenience of those frequenting the fairs, there is an enormous market-hall, and sixty blocks of buildings for booths, containing more than 2500 apartments separated by fireproof walls. There are three annual fairs, two of them of minor account. The third, beginning at the 15th of July and continuing into September, is still the greatest in the world. But like the fair of Leipzig, it is evident that the great Russian fair is declining in importance. During the fair, the normal population (66,716 in 1885) is increased fivefold or even sevenfold; and the value of the goods sold at the great fair of 1889 was stated at £18,854,277. At these fairs all foreign goods were supplied in smaller quantities, those of Russian production showing an increase. Nijni-Novgorod, founded in 1221, was devastated on several occasions by the Tartars; its prosperity dates from the year 1817, when the great fair was removed to Nijni-Novgorod from Makarief after a great fire.—The *government*, which has an area of 19,797 sq. m. and a pop. (1885) of 1,513,318, produces timber, iron and iron goods, salt, copper, gypsum, wool, and leather.

Nijni-Tagilsk, a town of the Russian government of Perm, amid the Ural Mountains, 150 miles E. of Perm by rail, with great platinum, copper, and iron works. Pop. 30,000.

Nikolaevsk, a decayed town of eastern Siberia, 23 miles from the mouth of the Amur. Pop. 3500.

Nikolaieff, headquarters of the Russian Black Sea fleet, in the government of Kherson, at the confluence of the Ingul with the Bug, and 42 miles from the Black Sea. The joint estuary of the Bug and Dnieper is defended by the forts of Otchakoff and Kinburn; and Nikolaieff is a great fortified naval station, with docks, an arsenal, &c., and has a large trade in exporting grain, though its imports are trifling. Since its connection with the central railway system of Russia its trade and importance have increased rapidly. Pop. (1885) 67,249.

Nikolsburg (Czech *Mikulov*), a town of Austria, in the south of Moravia, 27 miles S. of Brünn by rail, lies at the foot of hills famous for their rich red wines. In the middle of the town, upon a rock, stands the castle of the princely Dietrichstein family. Pop. 7642.

Nikon (1605–87), the Russian patriarch and primate whose revision of the very incorrect Slavonic service-books caused the secession of the Raskolniks (q.v.).

Nikosia. See NICOSIA.

Nile, the longest river of Africa, if not of the world, hydrographically, historically, and geographically a river of the greatest interest, and to the ancient Egyptians pre-eminently *the* sacred river, draws its largest supplies of water in the country of its sources from the Victoria and Albert Nyanzas. Several streams flow into the Victoria Nyanza, but which originates farthest to the south is not yet definitely known; the honour seems to lie between the Shimiyu and the Isanga. At any rate, the most distant feeders of the great river may probably be placed near to 4° S. lat. The river Kagera or Alexandra Nile, which joins the Victoria Nyanza high up on the west side, is believed to issue from Lake Alexandra, some 250 miles to the south-west; that stream brings a large volume of water to the lake. The Nile leaves Victoria Nyanza at its northern end, pouring over the Ripon Falls, 150 to 170 yards wide but only 12 feet high, and then for 300 miles races between high rocky walls, over rapids and cataracts, at first north-west, then west, until it joins Albert Nyanza near its north-east corner. About 20 miles from this lake the river leaps down 120 feet into a wild gorge, with high rocky walls. The section between the two Nyanzas is called the Victoria Nile or Somerset River. At its south-western extremity the Albert Nyanza is joined by the river Semliki, which drains away the surplus water of the Albert Edward Nyanza (discovered by Stanley in 1889); and this lake in its turn drains the slopes of the snowy Ruwenzori and adjacent mountains. The combined river leaves the northern extremity of the Albert Nyanza as the Bahr-el-Jebel, and from that point flows in a general northerly direction to the Mediterranean. The first 130 miles to Dufile it passes through a level country, and frequently

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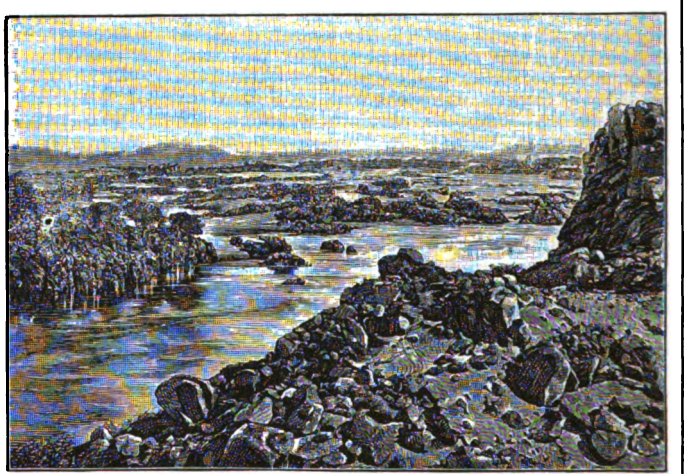
expands into lakes. From Dufile to Lado (120 miles) the bed is contracted by rocky hills from a mile to a quarter of a mile in width; and the stream is forced over the Yarborah Rapids. At Lado (5° N. lat.) the river enters the plains, and moves thence slowly and sluggishly down to Khartoum, 900 miles to the north. The whole of this stretch is navigable for river-steamers of fairly large size. In 7½° N. lat., however, the main channel divides; whilst the right arm, the Bahr-el-Zeraf, goes almost due north, the left arm, which still continues to be called the Bahr-el-Jebel, trends slightly to the west. Both streams flow, at no great distance apart, through a low swampy region, that is during the rainy season generally inundated for miles wide. The banks are lined with tall reeds and papyrus, the abode of numerous aquatic birds, and the shelter of swarms of gnats and other insect plagues. Since the year 1863 both these channels have been at times rendered wholly or in part impassable by vast accumulations of vegetable debris completely choking them. In 9½° N. lat. the Bahr-el-Jebel is met by the Bahr-al-Ghazal, which, coming directly from the west, gives the united stream, now called the White Nile, a due easterly course. Although this tributary, navigable for some 200 miles above the confluence, runs nearly dry in the dry season, it gathers to itself the contributions of a very large number of rivers, some of them 300 and 400 miles long, which have their sources to the south and south-west in the country of the Niam-Niam tribes; one only, the Bahr-al-Arab, comes from the northern side—viz. from Darfur, to the north-west.

Sixty miles east of the confluence the White Nile receives the Bahr-el-Zeraf, and 30 miles farther east still the Sobat, which, navigable for 180 miles, if not farther, has its sources on the western slopes of the Galla country, to the south-east. From the point of junction with this affluent the White Nile flows almost directly north to Khartoum without being augmented by a single tributary stream. At Khartoum (in 15° 37′ N. lat.) the White Nile, or Bahr-al-Abiad, is joined from the south-east by the Blue Nile, the Bahr-al-Azrak, the water of the respective streams being of the colour indicated in the names. The Blue Nile, 950 miles long, gathers its volume principally from Lake Tana (5658 feet above sea-level), situated on the Abyssinian plateau, in which region it is known as the Abai. It leaves the lake towards its southern end, and, after running south-east, curves right round by way of the south till it comes to flow north-west. After leaving the mountains it traverses an extremely fertile plain, the capital of which is Sennaar. From Khartoum the Nile flows north-north-east, and 200 miles below that city is joined from the right by the Atbara, called also the Bahr-al-Aswad, or Black Nile. It is the black sediment brought down by this river that settles in the Nile delta, and makes it so extraordinarily fertile. This affluent, too, has its source on the Abyssinian plateau, and its volume is increased by two large tributaries, the Takazze and Mareb, both striking into it from the right. During its course from the confluence of the Atbara through the Nubian Desert the great river makes two deep bends, first round by the north, then round by the south, and subsequently resumes its northerly flow. Below Khartoum navigation is rendered extremely dangerous by the cataracts which obstruct the bed of the river, the sixth occurring not far north of Khartoum, the first near Assouan, in Egypt, just above 24° N. lat. The course of the river from Assouan to the sea is sufficiently described under Egypt (q.v.), where also a map of the entire course is sketched. The total length of the river cannot be stated precisely; from Victoria Nyanza it is estimated to measure 3400 miles. The Nile begins to rise at Gondokoro in April, the Bahr-al-Ghazal perhaps a week or two earlier. At Khartoum the rise begins in May, and reaches its maximum in September, whilst the Blue Nile rises from July to the third week in August (see NILOMETER). Irrigation is largely regulated by the great Nile Barrages at Rosetta and Damietta, constructed by French engineers in 1843–61, and practically reconstructed in 1886–90 at a cost of £405,000.

The ancients had little authentic knowledge of the Nile above Meroe, the ruins of which lie nearly half-way between Berber and Khartoum. The place of accurate knowledge was taken by myth, to the effect that the river had its origin in Mauretania (now Morocco), and flowed several days' journey underground until it came to the south of Ethiopia; thence it passed northwards as the Astapus. The Emperor Nero began the fascinating work of searching for the sources of the Nile by sending two expeditions, which seem to have ascended beyond the confluence of the Sobat and White Nile. Ptolemy speaks of two streams issuing from two lakes 6 and 7 degrees south of the equator and uniting in 2° N. lat., and being joined in 12° N. lat. by the Astapus, which likewise flowed from a lake (Coloe). The two lakes in the far south were fed by the melting snows of a great range of mountains, the Mountains of the Moon (which Stanley now identifies with Ruwenzori, Gordon Bennett, and the adjoining peaks). This remained the sum total of information about the river down to the 19th century, except that in 1770 Bruce discovered that the Blue Nile issued from Lake Tana. The Egyptian government in the years 1839–42 sent three expeditions up the river, which got as far as Gondokoro. In 1858 Speke reached the Victoria Nyanza, and in 1862 discovered Ripon Falls. Two years later Sir Samuel Baker discovered Albert Nyanza, and in 1868–71 Schweinfurth explored the western feeders of the White Nile. Stanley, in 1875, sailed all round Victoria Nyanza, and in 1889 traced the



The Nile.—The First Cataract, looking down the river towards Assouan.

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course of the Semliki, and discovered Albert Edward Nyanza and Mount Ruwenzori.

See works of the explorers named, also others by Marno, Von Klöden, Wilson and Felkin, Schuver, Petherick, Junker, &c., with Walter Budge's *The Nile: Notes for Travellers in Egypt* (1890). For the battle of the Nile, see ABOUKIR.

Nilgiri. See NEILGHERRY.

Nilometer, an arrangement for measuring the height of the Nile in Egypt. On the island of Rhoda, opposite to Cairo, is a square well, connected with the river by a canal, and containing a graduated marble pillar, divided into 24 cubits, each measuring 21·386 inches. A rise of 18 cubits is traditionally regarded as the height of the lowest inundation; 19 cubits is considered tolerable, 20 excellent, 21 adequate, and 22 complete, but 24 is ruinous. The ordinary maximum of the rise at Cairo is stated at from 24 to 26 feet. For the inundations from 1849 to 1878, see *Nature*, vol. xxv. The nilometer of Rhoda was constructed during the reign of the calif Al-Mutawakkil, in the year 847. Anciently there seem to have been various nilometers of different kinds, all along the river, as at Memphis (probably the oldest), Ekhmin, Elephantine, and elsewhere.

Nilsson, CHRISTINE, operatic singer, was born the daughter of a farmer at Wexiö, in Sweden, 3d August 1843, and singing at a fair in 1857 so impressed a magistrate of Ljungby that he sent her for a musical education to Stockholm and Paris. She made her début at Paris in *La Traviata* in 1864; and in London, where she appeared in 1867, soon took rank as one of the foremost soprano singers. Marguerite is one of her best-known parts. She has repeatedly visited the United States. She was married (1872) to M. Rouzaud, who died in 1882.

Nimach, a town of India, in the territory of Gwalior, on the north-western border of Malwa, 370 miles SW. of Delhi by rail, 1613 feet above sea-level, with an agreeable and healthy climate. There has been a British cantonment here since 1817. Pop. of town, 5161; of cantonment, 13,069.

Nimbus, in Art, especially in Sacred Art, is the name given to the disc or halo which encircles the head of the sacred personage who is represented. Its use is almost universal in those religions of which we possess any artistic remains—the Indian, the Egyptian, the Etruscan, the Greek, and the Roman. Some, indeed, have sought directly to derive it from the Greek *mēniskos*, or metal disc placed over the heads of statues to keep off the droppings of birds. Nevertheless, the nimbus, strictly so called, is comparatively recent in Christian art, not appearing before the 6th century. Later in Christian art it became almost a necessary appendage of all representations of God or of the saints. Its ordinary form is the circular or semicircular; but the nimbus of the Eternal Father is often in the form of a triangle, and that of the Trinity an emanation of light, the rays of which form the three arms of a cross. The nimbus of the Virgin is sometimes a simple ring, and sometimes a crown or diadem; occasionally it is encircled by an ornamental border, on which twelve stars are sometimes represented. Her nimbus, as well as that of the Divine Persons, is commonly of gold; but occasionally it is in colours, as blue, red, purple, or white. The nimbus of the saints is ordinarily the semicircle or lunula. In later art the nimbus became lighter and more aërial, melting, as it were, into the picture. In connection with the nimbus may also be mentioned the *Aureole*, an illumination surrounding, not the head only, but the entire figure. If the figure be upright the aureole is commonly oval, when it is called the *vesica piscis*, and is supposed to contain an allusion to the sacred Christian emblem, the *ichthys*. With a seated figure it becomes circular, and is occasionally divided by radiating bands, in the form of a wheel; sometimes it takes a quatrefoil form. It is commonly of gold, but occasionally also is in colours. The *Glory* is a combination of the nimbus and the aureole, and is chiefly seen in Byzantine pictures and those of the early South German school.

Nimeguen (Dutch *Nijmegen*), a town of Holland, in the province of Guelderland, on the left bank of the Waal, 73 miles by rail E. of Rotterdam. It is built on the slope of the Hoenderberg ('Hill of the Huns'), on which the Romans formed the permanent camp of *Noviomagum;* and some of its streets are steep and narrow, but others are broad and handsome. On a neighbouring height stood till 1796 a castle, said to have been founded by Cæsar and inhabited by Charlemagne; and towards the brow of this height there still stands a little sixteen-sided Romanesque baptistery of the 12th or 13th century. On another eminence is the modern Belvidere, whose summit commands a wide view. The fortifications have been demolished; but Nimeguen retains its Renaissance town-hall (1554), adorned with medallions of German emperors, and the fine Gothic church of St Stephen (dating from 1272). The manufactures include tobacco, Eau de Cologne, metal-work, beer, &c. Pop. (1875) 22,929; (1890) 32,326. Regained by the Spaniards (1585–91), Nimeguen is celebrated in history for its great peace congress, which on 12th August 1678 concluded a treaty between France and Holland, on 13th December between France and Spain, and on 5th February 1679 between Austria and France.

Nîmes, the capital of the French department of Gard, lies in a fertile plain, engirt by the vine-clad Cevennes, 31 miles by rail NE. of Montpellier and 30 SW. of Avignon. The old town, with narrow crooked streets, is separated by shady boulevards from the well-built faubourgs; and mediæval and modern edifices are a much mutilated cathedral, the prison (formerly citadel, 1687), the palais de justice, St Paul's (1850), St Baudile's (1875), &c., with a most magnificent fountain, and a monument (1874) to Antoninus Pius. But the glory of Nîmes is its Roman remains of the ancient *Nemausus*. These include the 'Maison Carrée' (now a museum, with Delaroche's masterpiece, 'Cromwell looking on Charles I.'s corpse'), a splendid specimen of Corinthian architecture; an amphitheatre (now a bull-arena), 70 feet high, and seating 20,000 spectators; the exquisite Nymphæum; a mausoleum ('La Tour magne'), baths, and two gates, whilst 14 miles NE. is the 'Pont du Gard,' most perfect of Aqueducts (q.v.). Nîmes is a seat of great commerce and manufactures, these comprising silk and cotton goods, carpets, shawls, wine, brandy, boots, &c. Pop. (1872) 60,020; (1886) 67,274, of whom one-third were Protestants. Supposed to have been colonised from *Massilia* (Marseilles), and the capital of the Volcæ Arecomici, Nîmes flourished under the Romans, and was one of the great cities of Gaul. It was taken by the Visigoths (465), the Franks (507), and the Saracens (725), and subsequently became an appanage of Aragon, but was finally restored to France by the treaty of Corbeil (1259). The inhabitants adopted Calvinism in the 16th century; and it was a stronghold of the Camisards (q.v.). In 1791 and 1815 it was the scene of bloody religious and political reactions. Nicot, Guizot, and Daudet were natives. See works by Ménard (7 vols. 1875), Perrot (11th ed. 1856), Durand (1876), and Pieyre (3 vols. 1888).

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Nimrod. See BABYLONIA, Vol. I. p. 633, BABEL; as a *nom de plume*, see APPERLEY.

Nine Eyes, a popular name for the young lampreys found in rivers. See LAMPREY.

Nineveh, the modern *Kouyunjik*, capital of the ancient kingdom of Assyria. Its original capital was Assur, the ruins of which are now called *Kalah Sherghat*, but the group of cities some sixty miles to the north, above the Greater Zab, and on the eastern side of the Tigris, namely Nineveh, Calah (*Nimrûd*), and Dur-Sargon (*Khorsabad*), ultimately supplanted it in importance. When Nineveh itself fell, the whole Assyrian empire—essentially a military power—perished with it. In the Sassanian period a village was built on the mounds which covered its ruins; but when its buildings had also crumbled into ruins, the very site of the proud ancient city remained for centuries unknown. Rich in 1818 conjectured that the mounds of Kouyunjik, opposite the modern town of Mosul, concealed its ruins beneath, but it was not until the excavations of Botta in 1842 and Layard in 1845 that the remains, first of Dur-Sargon, then of Nineveh itself, were revealed to the world. The sculptured monuments of its ancient kings and the relics of its clay-inscribed library soon yielded up their secrets to the investigations of scholars, and ere long the life and history of the ancient kingdom of Assyria were known almost with as much certainty as those of Greece and Rome. See ASSYRIA, and CUNEIFORM INSCRIPTIONS.

Ning-po, a treaty-port of the Chinese province of Che-keang, stands in a fertile plain, 16 miles from the mouth of the Takia (Ning-po) River and about 100 miles S. of Shanghai. It is surrounded by a wall 25 feet high and 16 feet thick, and contains numerous temples, colleges, &c., chief amongst them the temple of the Queen of Heaven, figured under CHINA (Vol. III. p. 187); the temple was founded in the 12th century, but the present building, elaborately and richly ornamented, dates from 1680. The people, 250,000 in number, make sedge hats and mats, grow cotton, catch cuttle-fish, and carry on an active trade, especially in the export of green tea. The customs returns show the annual value of the imports—chiefly opium (30 per cent. of the total), cotton and woollen goods, tin and iron, medicines (in transit), dried *lungngans*, kerosene oil, indigo, sugar, and tobacco—to be £1,887,900, and the exports—green tea (70 per cent. of the total), cuttle-fish, sedge hats and mats, silk goods, and raw cotton—to be £1,259,300. Apart from junks, some 550 vessels, of 382,800 tons, enter every year, of which 158 vessels, with an aggregate of 127,900 tons, are British.

Ninian, ST, the first known apostle of Scotland, was born of noble parentage, about 360, on the shores of the Solway Firth. Of studious and ascetic habits, he was moved by the Holy Spirit to make a pilgrimage to Rome, and there, after some years' stay, was consecrated bishop by the pope. On his homeward way he visited St Martin (q.v.) at Tours, and after his arrival in Galloway he founded the 'Candida Casa,' or church of Whithorn, dedicating it to St Martin, the news of whose death had just reached him (397). Later he laboured successfully for the evangelisation of the Southern Picts, and in 432 (according to the Bollandists) died 'perfect in life and full of years,' and was buried in his church at Whithorn. His festival falls on 10th September. His Life by St Ailred (1109–66), abbot of Rievaulx in Yorkshire, who visited Galloway, has been edited by Bishop Forbes (vol. v., 'Historians of Scotland' series, 1874), who enumerates sixty-six dedications in Scotland to St Ninian or 'Ringan'—the Lowland Scotch form of his name—including the Episcopal cathedral at Perth.

Ninon. See LENCLOS.

Ni'obe, in Greek Mythology, the daughter of Tantalus and wife of Amphion, king of Thebes, to whom she bore six sons and six daughters. Proud of her children, she despised Leto or Latona, who had only two children, Apollo and Artemis; whereupon Latona, enraged at her presumption, moved her children to destroy all the children of Niobe with their arrows. They lay nine days in their blood unburied, when Zeus changed them into stone, and on the tenth day they were buried by the gods themselves. Niobe was changed into stone on Mount Sipylus, in Lydia, from which tears flowed every summer. Such is the Homeric legend, which, however, was afterwards much varied and enlarged. Only fragments exist of the tragedies of Æschylus and Sophocles on this theme, which was a favourite subject of ancient art. A noble group representing Niobe and her children was discovered at Rome in 1583, and is now in the Uffizi Palace at Florence. Even the ancient Romans were in doubts whether the work proceeded from Scopas or Praxiteles. See Heydemann, *Analekten zu den Kunstdarstellungen der Niobe* (Leip. 1883).

Niobium (sym. Nb; equiv. 94) is a rare metal discovered by H. Rose in the mineral *Tantalite*. It may be obtained by passing the vapour of the chloride along with hydrogen through a red-hot tube. It is of a steel-gray colour, specific gravity 4·06, and takes fire when heated in the air or in chlorine gas. It is but little acted on by hydrochloric or nitric acid, but is soluble in strong sulphuric acid. It forms compounds with oxygen, chlorine, sulphur, &c., but these are of little practical importance.

Niort, the capital of the French department of Deux-Sèvres, pleasantly situated on the navigable Sèvre Niortaise, 43 miles NE. of La Rochelle and 109 SW. of Tours. An important railway junction, it has an old castle, a hôtel-de-ville (1530), a fine public garden, and the 16th-century church of Notre Dame, with a spire 246 feet high. The dressing of leather and the manufacture of gloves are the leading industries. Pop. (1872) 20,022; (1886) 22,079. Niort in the 14th century was held for eighteen years by the English. It was the birthplace of Madame de Maintenon. See Favre's *Histoire de Niort* (1880).

Nipigon, a lake of Ontario, 30 miles NW. of Lake Superior, with which it is connected by the Nipigon River. It is about 70 miles long, but its deeply-indented coast-line measures 580 miles. Its greatest depth is 540 feet. The lake is studded with hundreds of islands.

Nip'issing, a lake of Ontario, north-east of Lake Huron, into which (Georgian Bay) it drains through French River (55 miles). Its length is about 50 by 28 miles.

Nipples. See BREASTS.

Nippon. See JAPAN.

Nirvâna. See BUDDHISM, Vol. II. p. 519.

Nisch, the chief town and commercial centre of southern Servia, stands in the midst of a vine-growing district, 152 miles by rail SE. of Belgrade. It is the seat of a Greek bishop and has a fairly strong citadel (1737). The place has played a conspicuous part in the Turkish wars from 1375 down to 1878, when it was occupied by Servia. Here, on 23d September 1689, the Austrians defeated the Turks. Pop. (1884) 16,178.

Nishapur, a town of the Persian province of Khorassan, 53 miles W. of Meshed, in a beautiful and fertile valley, has 11,000 inhabitants and a

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trade in turquoises. It was the birthplace, and contains the grave, of Omar Khayyám.

Nisibis, the capital of ancient Mygdonia, the north-eastern part of Mesopotamia, was a city of great antiquity, and was of importance both as a place of strength and as an emporium of the trade between the east and west. It was twice taken by the Romans (under Lucullus and Trajan), and again given up by them to the Armenians; but being a third time taken, in 165 A.D., it remained the chief bulwark of the Roman empire against the Persians, till it was surrendered to them after the death of Julian in 363. The name *Nisibin* is retained by a small village in the Turkish province of Diarbekir, round which are numerous remains of the ancient city.

Nisi prius is the name (borrowed from the first two words of the old writ which summoned juries) usually given in England to the sittings of juries in civil cases. Thus, a judge sitting at *nisi prius* means a judge presiding at a jury trial in a civil cause, and a *nisi prius* lawyer is one who devotes himself to jury practice.—For the decree *nisi*, see DIVORCE.

Nith, a beautiful Scottish river, rising in Ayrshire, and flowing 71 miles south-south-eastward (mainly through Dumfriesshire), until, 14 miles below Dumfries, its estuary joins the Solway Firth.

Nithsdale, WILLIAM MAXWELL, EARL OF, was born in 1676, and at seven succeeded his father as fifth earl. In 1699 he married at Paris Lady Winifred Herbert (*c.* 1679–1749), youngest daughter of the Marquis of Powis, and thenceforward lived almost constantly at his Kirkcudbrightshire seat, Terregles, much embarrassed in circumstances, and sorely troubled as a Catholic by the neighbouring Presbyterian ministers. In 1715 'Nithsdale's bonnie lord' at once joined the English Jacobites under Forster and Derwentwater, and was taken prisoner at Preston. He was tried for high-treason in London, and sentenced to death in spite of abject excuses; but on 23d February 1716—the night before the day fixed for his execution—not knowing he had just been reprieved, he escaped from the Tower in woman's apparel, through the heroism of his countess. Naturally delicate and then advanced in pregnancy, she had ridden up to London in the depth of winter; and after her lord's escape she came back to Terregles, and dug up the family deeds, which she had buried in the garden, and by one of which the estates had been disponed in 1712 to their only son. They now settled at Rome, where the earl died on 20th March 1744. See Sir W. Fraser's *Book of Carlaverock* (2 vols. 1873).

Nitrates. See NITRE, NITRIC ACID, NITRIFICATION, MANURE.

Nitre, or SALTPETRE (Lat. *sal petræ*, 'salt of the rock,' through Old French), is the nitrate of potash, KNO_3. It usually occurs in long, colourless, striated, six-sided prisms; its taste is cooling, and very saline; it is soluble in seven times its weight of water at 60° (15·5° C.), and in less than one-third of its weight of boiling water, but is insoluble in alcohol. When heated to about 660° (348° C.) it fuses without decomposition into a thin liquid, which, when cast in moulds, solidifies into a white, fibrous, translucent mass, known as *sal prunelle*. At a higher temperature part of the oxygen is evolved, and nitrate of potash is formed. Owing to the facility with which nitre parts with its oxygen, it is much employed as an oxidising agent. Mixtures of nitre and carbon, or of nitre and sulphur, or of nitre, carbon, and sulphur, deflagrate on the application of heat with great energy; and if nitre be thrown on glowing coals it produces a brisk scintillation. *Touch-paper* is formed by dipping paper in a solution of nitre, and drying it.

Nitre occurs as a natural product in India and Persia, where it is found sometimes as an efflorescence upon the soil, and sometimes disseminated through its upper stratum. The crude salt is obtained by lixiviating the soil, and allowing the solution to crystallise. Much nitre used to be artificially formed in Europe by imitating the conditions under which it is naturally produced. Animal matter, mingled with ashes and lime rubbish, is placed in loosely aggregated heaps, exposed to the air, but sheltered from rain. The heaps are watered from time to time with urine or stable runnings; at suitable intervals the earth is lixiviated, and the salt crystallised. As there is always a considerable quantity of the nitrates of lime and magnesia present, which will not crystallise, carbonate of potash, in the shape of wood-ashes, is added so long as any precipitate occurs. The nitrate of lime is decomposed, and the insoluble carbonate of lime separated. The clear liquor is then evaporated and crystallised. But the bulk of the nitre of commerce is now made from the Chilian nitrate of soda by double decomposition. The common varieties of Indian nitre, which have a dirty yellowish appearance, are termed *rough* or *crude saltpetre*, while the purer kinds are called *East India refined*. The purification or refining of nitre is effected by dissolving it in water, boiling the solution, removing the scum, straining it while hot, and setting it aside to crystallise. The most common impurities are sulphate of potash, chlorides of sodium and potassium, and nitrate of lime. Chloride of barium will detect the first of these impurities, nitrate of silver the second, and oxalate of ammonia the third.

Nitre is employed in the manufacture of sulphuric acid, in the preparation of nitric acid, as an oxidising agent in numerous chemical processes, as an ingredient of fireworks, and especially in the manufacture of gunpowder. It is used in medicine. In moderate doses (from ten grains to a scruple) it acts as a refrigerant, diuretic, and diaphoretic, and hence its use is indicated when we wish to diminish abnormal heat, and to reduce the action of the pulse, as in febrile disorders and hemorrhages. In acute rheumatism it is given in large doses with great benefit. It is a popular remedy in sore throat, in the form of nitre balls, which should be retained in the mouth till it melts, and the saliva impregnated with it gently swallowed. The inhalation of the fumes produced by the ignition of *touch-paper* often gives speedy relief in cases of spasmodic asthma.

Cubic Nitre, or *Nitrate of Soda*, $NaNO_3$, occurs abundantly on the surface of the soil in Chili and Peru (especially Atacama and Tarapacá). It derives its name from its crystallising in cube-like rhombohedrons. In most of its properties it resembles ordinary nitre, but, in consequence of its greater deliquescence, it cannot be substituted for that salt in the preparation of gunpowder. Being considerably cheaper than the potash-salt, cubic nitre is often substituted for it in the manufacture of nitric and sulphuric acids; and it is largely used in agriculture (see MANURE). In 1882 the amount shipped from South American ports was stated at 476,000 tons; in 1889, at 930,000. See W. H. Russell's *Visit to Chili and the Nitrate Fields of Tarapacá* (1890). For the Sweet Spirits of Nitre, see NITROUS ETHER.

Nitrian Desert. See NATRON LAKES.

Nitric Acid is the most important of the five compounds which oxygen forms with Nitrogen (q.v.). Until 1849 it was known only in the hydrated form (the *aquafortis* of the older chemists),

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but in that year Deville showed that *Anhydrous Nitric Acid*, or *Nitric Anhydride*, N_2O_5 (see NITROGEN), might be obtained in transparent colourless crystals by the action of perfectly dry chlorine gas on well-dried crystals of nitrate of silver, the reaction being exhibited in the equation :

Nitrate of Silver. Chlorine. Chloride of Silver. Nitric Anhydride. Oxygen.

$$2AgNO_3 + Cl_2 = 2AgCl + N_2O_5 + O$$

It is a very unstable compound, and sometimes explodes spontaneously. It dissolves in water with evolution of much heat, and forms hydrated nitric acid. Nitric Acid (sym. HNO_3; equiv. 63; sp. gr. 1530), when perfectly pure, is a colourless, limpid, fuming, powerfully caustic fluid, possessing an intensely acid reaction, as shown by its action on litmus. It boils at 187° (86° C.). It parts very readily with a portion of its oxygen to most metals, and hence is used in the laboratory as an oxidising agent. Whether in the concentrated or in a more dilute form, it acts energetically on organic matters. As examples of such actions we may refer to its power of decolorising indigo; of staining the skin and all albuminous tissues of a bright-yellow colour; of coagulating fluid albumen; and of converting cotton fibre into an explosive substance (see GUN-COTTON). The applications of this acid in the arts, in manufactures, and in chemical processes are very extensive.

The concentrated acid, HNO_3, is by no means a stable compound. If it be exposed to the action of light it is decomposed with the formation of lower oxides of nitrogen; and mere distillation produces a similar effect. When it is mixed with water it emits a sensible amount of heat, owing to the formation of a much more stable hydrate, $2HNO_3 + 3H_2O$, which distils at 250° (121° C.) without change, and is unaffected by exposure to light. Its specific gravity is 1·424; and it is found that a weaker acid when heated parts with its water, and a stronger acid with its acid, till each arrives at this density. The existence of this hydrate has, however, been called in question by Roscoe. The so-called *Fuming Nitric Acid* is merely a mixture of the pure acid with one of the lower oxides.

Nitric acid does not occur naturally in a free state; but it is found tolerably abundantly in combination with potash, soda, lime, and magnesia; and after thunderstorms traces of it, in combination with ammonia, are found in rain-water. It may be formed in small quantity by passing a series of electric sparks through a mixture of its component gases in the presence of water, which is a mere imitation, on a small scale, of the mode in which it is produced in the atmosphere by a storm. It is usually prepared in the laboratory by the application of heat to a mixture of equal weights of powdered nitre (nitrate of potash) and oil of vitriol (hydrated sulphuric acid) placed in a retort. A combination of sulphuric acid and potash remains in the retort, while the nitric acid distils over, and is condensed in the receiver, which is kept cool by the application of a wet cloth. The reaction is explained by the equation :

Nitre. Sulphuric Acid. Nitric Acid. Bisulphate of Potash.

$$KNO_3 + H_2SO_4 = HNO_3 + KHSO_4$$

During distillation red fumes appear, arising from the decomposition of a portion of the nitric acid and a formation of some of the lower oxides of nitrogen. In this operation *two* equivalents of oil of vitriol are taken for *one* of nitre, these being the proportions found by experience to be most suitable. If they are taken equivalent for equivalent, a very impure red fuming acid is the result. In the manufacture of nitric acid on the large scale the glass retort is replaced by a cast-iron cylinder coated with fire-clay, and the receiver by a series of earthen condensing vessels connected by tubes; and nitrate of soda (see NITRE) is substituted for nitre, in consequence of its being a cheaper salt, and of its containing 9 per cent. more nitric acid.

Nitric acid combines with bases to form *nitrates*, some of which, as those of potash, soda, oxide of ammonium, silver, &c., are anhydrous, while others combine with a certain number (often six) of equivalents of water of crystallisation. Most of them are soluble in water, crystallisable, and readily fusible by heat; and at an elevated temperature they are all decomposed, usually leaving only the oxide of the metal. If paper be soaked in a solution of a nitrate, allowed to dry, and ignited, it burns in the smouldering mode characteristic of *touch-paper*. This property is, however, shared by other salts.

The tests for this acid when it is present in small quantities are less satisfactory than those for the other ordinary mineral acids. All its compounds are so soluble that no *precipitant* for this acid is known. The best method for its detection is mixing the fluid to be tested with a solution of sulphate of iron, and then carefully pouring sulphuric acid through a tube to the bottom of the glass so as to form a lower layer. If much nitric acid is present a black colour is produced; if only a small quantity is present the liquid becomes reddish brown or purple; the dark colour being due to the formation of nitric oxide by the deoxidising action of a portion of the iron salt on the nitric acid.

Medicinal Uses.—In the British pharmacopœia there is both a strong and a dilute acid. The strong acid has a specific gravity of 1·42, contains 70 per cent. of real acid, HNO_3, while the diluted acid is prepared by mixing six ounces of the former with about twenty-five of distilled water, and has a specific gravity of 1·101. The dilute acid is used internally as a tonic in conjunction with bitter infusions. In many cases of biliousness, of chronic inflammation of the liver, and in syphilitic cases in which mercurials are inadmissible, it may be prescribed with great benefit, either alone or in conjunction with hydrochloric acid, externally as a bath or lotion, or internally in doses of about 20 minims properly diluted. The strong acid is useful as an escharotic; e.g. to destroy warts, some kinds of polypi, the unhealthy tissue in sloughing ulcers, &c., and as an application to parts bitten by rabid or venomous animals. Largely diluted—as 50 or 60 drops of the strong acid to a pint or more of water—it forms a stimulative application for torpid ulcers.

Nitrification is the changing of nitrogenous organic matter or ammonia compounds into nitrates. Possibly the nitrogen of the air under certain circumstances also undergoes this change in soils. Some authorities ascribe the change to 'a ferment,' 'an organised structure,' the 'micrococcus nitrificans,' &c., but it is a power possessed possibly by many micro-organisms. These nitrifying bacteroids perform their work under certain conditions. First, the temperature must be suitable, for at about 5° C. the process is stopped; but with a rise of temperature there is a proportionate increase of work—commencing at about 12° C.—until 37° is reached, which is the 'optimum' temperature, and from this onwards there is a diminution of action until the 'maximum' temperature of 55° C. is reached, when nitrification ceases. These bacteroids are annihilated at a temperature of 90° C., although the same result will follow *drying* even at a much lower temperature. The second condition is the presence of oxygen; and the third is the presence of a salifiable base, such as lime, potash, soda, &c., without which nitrification cannot proceed. Under these conditions nitrification goes on in every fertile soil, the atmospheric nitrogen, nitrogenous organic matter, or ammonia

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compounds being converted, in the presence of lime or potash, into the corresponding *nitrates* of lime or potash; and from these *nitric* compounds plants derive the most or all of their nitrogen, although some experimentalists maintain that some plants obtain part at least of their nitrogen from ammonia. See Lawes and Gilbert, *Proc. Roy. Soc.*, vol. xlvii.; Marshall Ward, *Phil. Trans.*, B. 1887, vol. clxxviii.

Nitro-benzol, $C_6H_5NO_2$, is a yellow, oily fluid, of sp. gr. 1·2, which may be distilled without decomposition, and boils at 415° (213° C.). It has a sweet taste, is insoluble in water, but dissolves freely in alcohol and ether. Its odour is very similar to that of oil of bitter almonds, which has led to its use in perfumery under the name of *Essence of Mirbane*. It is obtained by treating benzol, C_6H_6, with warm fuming nitric acid, when one atom of hydrogen is replaced by the group of atoms NO_2, so that the benzol, C_6H_5H, becomes converted into nitro-benzol, $C_6H_5NO_2$. The vapour of nitro-benzol when inhaled produces, after from 6 to 12 hours, coma and sometimes death. The fact that its action is so long delayed seems to indicate that its poisonous action is due to some product of its decomposition rather than to itself. In cases of poisoning artificial respiration and powerful stimulants should be resorted to.

Nitrogen (Fr. *azote;* sym. N; atom. wt. 14) is an elementary gas, which in the free state forms nearly four-fifths by volume of our atmosphere. In combination with other elements nitrogen is a necessary constituent of every organised body, and it forms a very large number of most important compounds. Its name (derived from *nitron*, 'nitre,' 'saltpetre,' and *gennaō*, 'I produce') was given to it shortly after it had been proved to be an essential constituent of nitre or potassium nitrate. Its presence in the atmosphere was discovered in 1772 by Rutherford, at that time a professor of botany in the university of Edinburgh. It was more particularly investigated soon after by Priestley, Scheele, and Lavoisier. It is a colourless, tasteless, inodorous gas, and was formerly regarded as permanent or incondensable; but it can be reduced to the liquid state by the application of sufficient pressure after it has been cooled to a very low temperature. The Critical Temperature (q.v.) of nitrogen, or the point of temperature above which it cannot be condensed into a liquid by the application of any pressure however great, is −146° C. When cooled to this temperature a pressure of thirty-five atmospheres must be applied in order to liquefy it.

Nitrogen is fourteen times as heavy as hydrogen, and is slightly lighter, bulk for bulk, than atmospheric air, its sp. gr. being 0·9713, compared with air = 1. It is but slightly soluble in water, one hundred volumes of water at ordinary temperatures dissolving only about one and a half volumes of it.

Whilst nitrogen is a constituent of all plant and animal organisms and of many important compounds, it is, in the free state, rather inert towards other elements, and does not readily enter into direct combination with them. It is not combustible, nor does it act in the atmosphere as a supporter of combustion, a lighted taper plunged into a jar containing nitrogen being at once extinguished. It is almost unnecessary to say that nitrogen is not poisonous, since it is breathed freely along with oxygen by all animals; but it cannot support animal life, and an animal placed in it will die from suffocation for want of the oxygen necessary for respiration. Its function in the atmosphere seems to be mainly that of diluting the oxygen with which it is there associated. Although nitrogen forms about 79·1 per cent. of the total volume and 77 per cent. of the total weight of the atmosphere, the free gas does not appear to play any important part in supplying nitrogen for the construction of the tissues of plants. Vegetable physiologists are at present actively inquiring into this question; and it appears to be definitely established that plants cannot directly absorb from the atmosphere the nitrogen which they require. It is found, however, that certain classes of plants when they are grown in a soil which is practically free from nitrogen compounds to start with do take up nitrogen. One explanation of this fact is that free atmospheric nitrogen becomes converted in small quantity into nitrogen compounds in the soil through the influence of micro-organisms present there. Another explanation attributes the fixation of nitrogen to micro-organisms existing in, or on the surface of, the plant. On the other hand, it has been conclusively shown that certain plants are unable to exist unless appropriate compounds of nitrogen are supplied to them in the soil in which they grow. The main supply of the nitrogen of plants is certainly drawn from nitrogen compounds existing in or artificially supplied to the soil. The most important of such nitrogen compounds are nitrates, which are present in every fertile soil. These may be produced by the decay in the soil of nitrogenous animal or vegetable matters existing in it or supplied to it as manure; or they may be added to it ready formed—as, for instance, in the form of sodium nitrate, which is frequently applied as a manure to soils poor in nitrates.

Many attempts have been made to discover methods by which the free nitrogen of the atmosphere could be converted on a manufacturing scale into nitrogen compounds, but as yet no workable and economical method has been discovered. There are numerous methods for preparing pure or nearly pure nitrogen. One method by which it is obtained very nearly pure is to remove the oxygen as completely as possible from atmospheric air. This can best be done by passing a current of air slowly through a red-hot tube packed with copper turnings or with spirals of copper wire gauze. The oxygen of the air combines with the copper to form an oxide of copper, whilst the nitrogen passes on. Or the oxygen can be very completely removed from a confined portion of moist air by suspending in it pieces of phosphorus until the volume of the gas ceases to diminish. Nitrogen can also be prepared by passing a current of chlorine gas into a solution of ammonia. In this method care must be taken always to use ammonia in excess, otherwise chloride of nitrogen would be produced, which is a dangerously explosive substance. A steady current of nitrogen can be very easily obtained by heating together strong solutions of ammonium chloride and of potassium nitrite. Owing to the great difficulty of forming compounds from free nitrogen, new compounds of nitrogen are generally prepared from compounds already existing. The most important of these compounds are the nitrates which are found in the soil in very considerable quantity in different parts of the world, and in some places occur in large deposits, as in the nitrate regions of South America. From these nitrates Nitric Acid (q.v.) and other compounds of nitrogen are derived. Several compounds of nitrogen with oxygen are known.

Nitrous Oxide, or laughing-gas, N_2O, was discovered in 1772 by Priestley, who obtained it by the action on nitric oxide of easily oxidisable substances. It is now prepared by the action of heat on ammonium nitrate:

$$NH_4NO_3 = N_2O + 2H_2O.$$

It is a colourless gas, which can with moderate ease be reduced to the liquid state, a pressure of thirty

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atmospheres being required to liquefy it at 0° C. Davy discovered in 1800 that it possessed anæsthetic properties, and it is now used as an anæsthetic in minor surgical operations. For such purposes it is stored in the liquid state by dentists and others in wrought-iron bottles. It is a supporter of combustion, and burning materials placed in it continue to burn with almost as great brilliancy as if placed in free oxygen.

Nitric Oxide, NO, is produced by the action of nitric acid on copper, silver, or mercury. It is a colourless gas, which like nitrogen can only be reduced to the liquid state by pressure after it has been cooled to a very low temperature. Its most striking character is the great readiness with which it unites with free oxygen, forming dense brown fumes, which consist mainly of peroxide of nitrogen.

Nitrous Anhydride has been described as a gas easily condensable to a liquid, possessing the composition represented by the formula N_2O_3. It seems very questionable whether a single substance exists either in the state of gas or of liquid possessing this composition. The gas which was supposed to be nitrous anhydride was certainly a mixture. Although nitrous anhydride cannot be obtained pure, and the corresponding acid—nitrous acid—is an unstable substance at ordinary temperatures, a number of nitrites, salts corresponding to nitrous acid, are known.

Peroxide of Nitrogen, NO_2 or N_2O_4, is produced when oxygen and nitric oxide are mixed. It is a dark-brown liquid at ordinary temperatures, which boils at 22°, yielding a brown vapour, and solidifies at −9°, forming colourless crystals.

Nitric Anhydride, N_2O_5, is the anhydride of nitric acid, and can be obtained amongst other ways from nitric acid by the action on it of phosphoric anhydride (see NITRIC ACID).

The following are some of the other more important nitrogen compounds: ammonia and the ammonium salts (see AMMONIA); the vegetable alkaloids (see ALKALOIDS); aniline and its derivatives; cyanogen and the cyanides, including hydrocyanic acid; albumenoid substances; urea and uric acid; nitro-benzene, and other nitro compounds; pyridine and allied substances, hydrazine compounds, ptomaines, &c. See AZOTISED BODIES.

Nitro-glycerine (known also as *Glonoin* or *Glonoin-oil*) can be readily prepared by dissolving glycerine in equal measures of strong nitric and sulphuric acids and pouring the solution into water, when the nitro-glycerine becomes precipitated. Nitro-glycerine was discovered by Sobrero, a young Italian chemist at Paris, who in 1846 found that by the above process he could produce a highly explosive mixture. There was little idea at the time of the value of the discovery, which was treated solely as a chemical curiosity, until about fifteen years later, when Alfred Nobel, a Swedish engineer and chemist, perceiving the value of the unrecognised explosive and turning his attention to its development, rapidly introduced it as a blasting agent for industrial purposes. The new explosive was eminently satisfactory so far as blasting power was concerned; but a series of fearful accidents, notably that to the ship *European* at Panama in 1866—numerous expedients devised to render it safe in transit notwithstanding—called public attention to the danger inseparable from its conveyance, and in 1869 parliament, so far as Britain was concerned, placed its veto on nitro-glycerine.

The drawbacks which culminated in this prohibition led to the production of the nitro-glycerine compounds, now forming a large group, notably dynamite (see DYNAMITE, Vol. IV. p. 144), in which nitro-glycerine, absorbed by some inert porous substance, is thereby rendered safe from the dangers incident to the employment of nitro-glycerine without such treatment. Nitro-glycerine, as manufactured on a large scale for commercial purposes, is formed by the mixture of strong nitric and sulphuric acids, cooled by water, previous to being introduced into a large leaden vessel, the temperature of which is kept down by water circulating through coils inside. Glycerine is then injected by compressed air as a fine spray, and becomes immediately nitrated, considerable heat being evolved. On the completion of the nitration, as indicated by the fall of temperature, the mixture is run off into another leaden vessel and allowed to stand. In about an hour the separation is complete. The nitro-glycerine, after being thoroughly washed in water and subsequently in an alkaline solution to remove every trace of acid, is ready for manufacture into dynamite or other nitro-glycerine compounds.

The utmost care is exercised in the above processes, and any abnormal rise in temperature is strictly guarded against, or accidents would arise. For similar reasons the materials employed in the manufacture of nitro-glycerine are in every particular the best and purest attainable. Colourless when pure, but having as an article of commerce a pale brown colour, nitro-glycerine is a dense, oily liquid, having a specific gravity of 1·6. It is inodorous, but has a sweet, pungent, aromatic taste; a single drop, however, if placed on the back of the tongue, will produce headache and pain in the back lasting for hours. By those accustomed to handling this substance, no inconvenience whatever is experienced. Nitro-glycerine enters into medical prescriptions for certain diseases of the heart.

If ignited in the open air nitro-glycerine burns rapidly and with a brisk flame without any explosion; and if poured out in a thin sheet it ignites with difficulty and burns incompletely; but it explodes at once if it is exposed to a moderately strong blow or concussion, to the concussion due to the explosion of gunpowder, to contact with red-hot iron, and especially to the action of detonating mixtures and fulminates. It likewise explodes on exposure to a high temperature, the exploding-point for nitro-glycerine compounds being about 420° F.; but 150° to 180° F. is sufficient to set up decomposition in the cartridge, and this will quickly raise the temperature to exploding-point. According to Dr Rudolf Wagner, nitro-glycerine, if chemically pure, may be cooled down to 4° without becoming solid; that of commerce, however, becomes solid if exposed for a considerable time to a temperature of about 40° to 45° F., crystallising in long needles, which are most dangerous to handle, since they explode, even if gently broken, with much violence. In such condition the nitro-glycerine compounds should not be used for blasting, but can be readily thawed in a simple form of pan heated by hot water. At 320° nitro-glycerine begins (according to Adriani) to decompose, giving off red vapours; and if the heat be suddenly applied, or slightly raised above this point, violent explosion will occur. For equal bulks nitro-glycerine is calculated to be thirteen times as strong as gunpowder, while for equal weights it is eight times as powerful.

Nitro-glycerine compounds have been employed in the largest blasts that have been made, notably those at Hell Gate (see BLASTING). The manufacture of nitro-glycerine compounds in Great Britain is strictly controlled by legislation, and carried on under government supervision. See Eissel, *Handbook of Modern Explosives* (1891).

Nitrous Ether, or NITRITE OF ETHYL, $C_2H_5NO_2$, is a very volatile ether, with an agree-

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able apple odour, and having a specific gravity of ·900. It boils at 64·4° (18° C.), and is highly inflammable. It is readily soluble in alcohol and glycerine, less so in water. It is very liable to decomposition, becoming acid on keeping. It may be prepared by the action of sulphuric acid and alcohol on nitrite of potash. In itself it is of little importance, but on account of its relation to the *sweet spirits of nitre* or *spirit of nitrous ether* is one of the most important drugs. It was for long thought that the virtues of this valuable remedy were proportionally due to the nitrous ether present, and attention was directed to the preparation of the pure substance. When this was administered in the form of solution of the strength of sweet spirits of nitre, it was found that its action was different from and inferior to that of the latter. The sweet spirits of nitre contains in addition aldehyde and paraldehyde, and it is believed that to these we must ascribe much of its virtue. Be this as it may, the legal test is based on the presence of some etherial body, presumably nitrite of ethyl, and yet many a sample may be efficacious and fail to satisfy the standard test. The *spirit* should be freshly made, be kept in well-closed bottles, and should not be acid. Its specific gravity should not exceed ·845, as an admixture of water tends towards decomposition. It may be prepared by the action of nitric and sulphuric acids on alcohol in the presence of copper, but manufacturers attain the same end by other processes. It is used, in conjunction with other medicines, as a diuretic, especially in the dropsy which follows scarlatina; and it is employed, in combination with acetate of ammonia and tartarised antimony, in febrile affections. The dose in febrile cases is from half a drachm to a couple of drachms; while for a diuretic two or three drachms should be given.

Nitrous Oxide. See NITROGEN.

Nitzsch, KARL LUDWIG, a Protestant theologian, was born 6th August 1751 at Wittenberg, laboured as pastor and superintendent, became in 1790 a professor at Wittenberg, and in 1813 director of the seminary for preachers there. Here he died, 5th December 1831. He wrote two works on revelation.—KARL IMMANUEL NITZSCH, his son, was born at Borna, in Saxony, 21st September 1787, studied at Wittenberg, preached there, and obeyed a call to a chair at Bonn in 1822. Here he laboured assiduously till 1847, when he went to Berlin as successor to Marheineke, as well as university preacher and consistorial councillor. Here he died, 21st August 1868. Nitzsch was the most prominent supporter of the Union (see LUTHERANS), and in theology he was an independent supporter of Schleiermacher's opinions. He subordinated dogma to ethics, and was one of the leaders of the 'Vermittelungstheologie'—the broad evangelical school. Of his books the chief are *System der Christlichen Lehre* (1829; Eng. trans. 1849), *Praktische Theologie* (3 vols. 1847–67), *Akademische Vorträge über Christliche Glaubenslehre* (1858), several volumes of sermons, and *Gesammelte Abhandlungen* (2 vols. 1870). See the studies by Beyschlag (2d ed. Halle, 1882) and Hermens (Barmen, 1886).—GREGOR WILHELM NITZSCH, philologist, a brother of the preceding, was born at Wittenberg, 22d November 1790. He studied in his native town, fought as a volunteer at Leipzig, became in 1827 professor at Kiel, in 1852 at Leipzig, and died there, 22d July 1861. His studies were mainly devoted to the Homeric poems, and the defence of their unity of origin. Of his writings may be named *Erklärende Anmerkungen zu Homers Odyssee* (1826–40), *Meletemata de Historia Homeri* (1830–37), and *Die Sagenpoesie der Griechen* (1852). See the study by Lübker (Jena, 1864).—KARL WILHELM NITZSCH, son of the preceding, was born at Zerbst, 22d December 1818, studied at Kiel and Berlin, became in 1844 extra-ordinary, in 1858 ordinary professor at Kiel, in 1862 at Königsberg, in 1872 at Berlin, and died 20th June 1880. His writings embrace historical studies on Polybius (1842) and the Gracchi (1847), *Die Römische Annalistik* (1873), *Deutsche Studien* (1879), as well as the posthumous history of the German people to the peace of Augsburg, edited by Matthäi (3 vols. 1883–85), and a history of the Roman republic, edited by Thouret (2 vols. 1884–85).—FRIEDRICH AUGUST BERTHOLD NITZSCH, theologian, son of Karl Immanuel, was born at Bonn, 19th February 1832, studied at Berlin, Halle, and Bonn, and became in 1868 professor of Theology at Giessen, in 1872 at Kiel. His writings include *Das System des Boethius* (1860), *Grundriss der Christlichen Dogmengeschichte* (1870), *Luther und Aristoteles* (1883).

Nivelles (Flem. *Nyvel*), a town in the Belgian province of Brabant, on the Thines, 19 miles by rail S. of Brussels. Its fine Romanesque church (1045) contains the relics of Pepin's daughter, St Gertrude. In 1381 the townsfolk of Ghent were defeated here by Count Louis of Flanders, and 6000 burned in a monastery. Nivelles has manufactures of cotton, paper, lace, &c. Pop. 10,788.

Nivernais, formerly a province in the middle of France, nearly corresponding to the present department of Nièvre. Its towns enjoyed municipal privileges at a very early period. The principal landowners were the counts, afterwards dukes, of Nevers, who held under their vassalage more than 1800 fiefs.

Nix, NIXIE, a class, mostly malignant, of northern water-spirits. See DEMONOLOGY.

Nizam's Dominions. See HYDERABAD.

Noah. See DELUGE.

Noailles, a distinguished French family which dates from the 11th century, and played an important part in history from the reign of Louis XIV. to the Revolution. Antoine (1504–62) was ambassador in England in 1553–56, and admiral of France. Anne Jules (1650–1708), son of the first duke, commanded against the Huguenots and in Spain during the war of the Spanish succession, and was made marshal; whilst his brother, Louis Antoine (1651–1729), was Archbishop of Paris from 1695 till his death, and was made cardinal in 1700. The third duke, Adrien Maurice (1678–1766), won the marshal's baton in the wars of Louis XV. in Spain, Italy, and Germany. The fifth duke, Paul François (1739–1824), attained eminence as a chemist and was elected to the Academy of Sciences in 1777; his brother, Emmanuel Marie Louis (1743–1822), was French ambassador at Amsterdam (1770–76), London (1776–83), and Vienna (1783–92). The sixth duke, Paul (1802–85), wrote historical works, and was elected to Chateaubriand's chair in the Academy in 1849. His second son, Emmanuel Victorien (born 1830), was ambassador at Washington (1872), Rome (1873), and Constantinople (1882–86), and has written works on the history and literature of Poland. A grandson of the third duke, Louis Marie (1756–1804), served in America under his brother-in-law Lafayette, embraced for a while the French Revolution, and defended San Domingo against the British.

Nobile Officium, the term used in the law of Scotland to denote the high prerogative right of the Court of Session to exercise jurisdiction in certain cases—as, for example, to appoint a judicial factor to young children or to lunatics.

Nobility, that distinction of rank in civil society which raises a man above the condition of

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the mass of the people. Society has a tendency to inequality of condition, arising from the natural inequality, physical, moral, and intellectual, of those who compose it, aided by the diversity of external advantages, and of the principles and habits imbibed at an early age. This inequality is apt to increase; the son inheriting the faculties of his father is more favourably situated than his father was for making use of them; and hence in almost every nation in even the very early stages of civilisation we find something like a hereditary nobility. Privileges originally acquired by wealth or political power are secured to the family of the possessor of them; and the privileged class come to constitute an order, admission into which requires the consent of society or of the order itself.

The ancient Romans were divided into *nobiles* and *ignobiles*, a distinction at first corresponding to that of patricians and plebeians. A new nobility afterwards sprang out of the plebeian order, and obtained (336 B.C.) the right to rise to high offices in the state; and in course of time the descendants of those who had filled curule magistracies inherited the *jus imaginum*, or right of having images of their ancestors—a privilege which, like the coat-of-arms in later ages, was considered the criterion of nobility. The man entitled to have his own image was a *novus homo*, while the *ignobilis* could neither have his ancestor's image nor his own.

The origin of the feudal aristocracy of Europe is in part connected with the accidents which influenced the division of conquered lands among the leaders and warriors of the nations that overthrew the Roman empire, and is sketched in the article Feudalism (q.v.); and the evolution of the dignities of Baron, Count (*Comes*), Earl, Marquis, Duke, and other ranks will be found under those several heads. In the subinfeudations of the greater nobility originated a secondary sort of nobility, under the name of Vavasours, Castellans, and lesser barons; and a third order below them comprised vassals, whose tenure, by the military obligation known in England as knight's service, admitted them within the ranks of the aristocracy. In France the allegiance of the lesser nobles to their intermediary lord long continued a reality; in England, on the other hand, William the Conqueror obliged not only his barons who held in chief of the crown, but their vassals also, to take an oath of fealty to himself; and his successors altogether abolished subinfeudation. The military tenant, who held but a portion of a knight's fee, participated in all the privileges of nobility, and an impassable barrier existed between his order and the common people. Over continental Europe in general the nobles, greater and lesser, were in use, after the 10th century, to assume a territorial name from their castles or the principal town or village on their demesne; hence the prefix 'de,' or its German equivalent 'von,' still considered over a great part of the Continent as the criterion of nobility or gentility. Britain was, to a great extent, an exception to this rule, many of the most distinguished family names of the aristocracy not having a territorial origin. See NAMES.

Under the feeble successors of Charlemagne the dukes, marquises, and counts of the empire encroached more and more on the royal authority, and by the end of the 9th century the Carlovingian empire had been parcelled into separate and independent principalities, under the dominion of powerful nobles, against whom, in Germany, the crown never recovered its power. In France, however, the royal authority gradually revived under the Capetian race, the great fiefs of the higher nobility being one by one absorbed by the crown. In England, where the subjection of the feudal aristocracy to the crown always was, and continued to be a reality, the resistance of the nobles to the royal encroachments was the means of rearing the great fabric of constitutional liberty. All those who, after the Conquest, held *in capite* from William belonged to the nobility. Such of them as held by barony (the highest form of tenure) are enumerated in Domesday. Their dignity was territorial, not personal, having no existence apart from baronial possession. The *comes* was a baron of superior dignity and greater estates; and these were in England the only names of dignity till the time of Henry III.

After the introduction of Heraldry (q.v.), and its reduction to a system, the possession of a coat-of-arms was a recognised distinction between the noble and the plebeian. On the Continent whoever has a shield of arms is a nobleman; and in every country of continental Europe a grant of arms, or letters of nobility, is conferred on all such a noble's descendants. In England, on the other hand, the words noble and nobility are restricted to the five ranks of the peerage constituting the greater nobility, and to the head of the family, to whom alone the title belongs. Gentility, in its more strict sense, corresponds to the nobility of continental countries (see GENTLEMAN). This difference of usage is a frequent source of misapprehension on both sides of the Channel; at some of the minor German courts the untitled member of an English family of ancient and distinguished blood and lineage has sometimes been postponed to a recently-created baron or 'Herr von,' who has received that title, and the gentility accompanying it, along with his commission in the army. It has been taken for granted that the latter belongs to the 'Adel' or nobility, and not the former. For the German nobility, see GERMANY, Vol. V. p. 177. Throughout the middle ages the lesser nobility of Britain preserved a position above that of most continental countries, being, unlike the corresponding class in Germany, allowed to intermarry with the high nobility, and even with the blood-royal of their country.

The higher nobility, or nobility in the exclusive sense, of England consist of the five temporal ranks of the peerage—Duke, Marquis, Earl, Viscount, and Baron (in the restricted signification of the word, q.v.), who are members of the Upper House of Parliament. Archbishops and bishops are lords temporal, but not peers. The dignity of the peerage is hereditary, but in early times was territorial, the dignity originally being attached to the possession of lands held directly from the crown in return for services to be performed to the sovereign. Later, peers were created by writ of summons to attend the king's council or parliament, but now the creation of a new peer is always made by letters-patent from the crown. In order to the efficient carrying out of the appellate jurisdiction of the House of Lords there are now a limited number of life peers, styled Lords of Appeal in Ordinary. By the Appellate Jurisdiction Act, 1876, as amended 1887, it is enacted that every such lord, unless he is otherwise entitled to sit in the House of Lords, shall by virtue and according to the date of his appointment be entitled during his life to rank as a baron, and shall be entitled to a writ of summons to attend and to sit and vote in the House of Lords. But his dignity is not to descend to his heirs. A peerage is forfeited by attainder for high-treason; attainder for felony forfeits a peerage by writ, not by patent; on attainder, peerage cannot be restored by the crown, only by an act of parliament. Ladies may be peeresses in their own right either by creation or by inheritance. The wives of peers are also styled peeresses. The question as to descent through males only or heirs-female will be found noted at

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the articles on the several orders of nobility. The oldest English peerage is the earldom of Arundel, dating from 1155, and now held by the Dukes of Norfolk; the Irish barony of Kingsale dates from 1181; to the period 1181–1205 belong four baronies now merged in other titles; the Scottish earldom of Sutherland goes back to 1228; and the baronies of Le Despencer, De Ros, and Hastings are all of the year 1264.

By the Act of Union between England and Scotland the Scotch peers elect sixteen of their number to represent their body in the House of Lords in each parliament. The peers of Ireland, in virtue of the Irish Act of Union, elect twenty-eight of their number to sit in the House of Lords for life. The Act of Union with Scotland has been understood to debar the sovereign from creating any new Scotch peerages; all peers created in either England or Scotland between that date and the union with Ireland are peers of Great Britain; and peers created in any of the three kingdoms subsequently to the union with Ireland are peers of the United Kingdom, with this exception that one new peerage of Ireland may be created on the extinction of three existing peerages. When the Irish peers are reduced to one hundred, then on the extinction of one peerage another may be created. All peers of Great Britain or of the United Kingdom have a seat in the House of Lords. A Scotch peer, though not one of the sixteen representative peers, is debarred from sitting in the House of Commons, a disability which does not attach to Irish peers. The peerage has from time to time recruited by new additions, the persons selected being in general peers of Scotland or Ireland; younger members of the families of peers; royal bastards (so recently as 1831); persons distinguished for naval, military, political, or diplomatic services; eminent lawyers promoted to high judicial appointments; persons of large property and ancient family, noble in the more extended sense; and lastly, persons who have by commerce acquired large fortunes and social importance. Many of the Scotch and Irish peers sit in the House of Lords as peers either of England, Great Britain, or of the United Kingdom. The privileges belonging to peers as members of parliament will be explained under PARLIAMENT; as peers, they also possess the following immunities: they can only be tried by their peers for felony, treason, or misprision of treason, when the whole members of the peerage are summoned. All the privileges belonging to the English peers, except the right of sitting in the House of Lords, were extended to the peers of Scotland by the Treaty of Union. A peer who has different titles in the peerage takes in ordinary parlance his highest title, one of the inferior titles being given by courtesy to his eldest son. Certain Courtesy Titles (q.v.) belong also to the daughters and younger sons of a peer, but do not extend to their children. British subjects can hold foreign titles of nobility only by consent of the crown. The ancient Scottish barony of Fairfax has since 1800 been confirmed to citizens of the United States, landholders in Virginia. The sixth baron was a friend of Washington, the tenth (1829–69) was speaker of the California House of Representatives. The barons of Longueuil, a Canadian family, are recognised in Britain (see LE MOYNE).

In France a limited body of the higher nobility, styled the peers, were in the enjoyment of privileges not possessed by the rest. The title of Duke was subject to strict rule, but many titles of Marquis and Count, believed to be pure assumptions, were recognised by the courtesy of society. The head of a noble family often assumed at his own hand the title of marquis; and if an estate was purchased which had belonged to a titled family the purchaser was in the habit of transferring to himself the honours possessed by his predecessor—a practice to which Louis XV. put a stop. Immediately before the Revolution 80,000 families claimed nobility, many of them of obscure station, and less than 3000 of ancient lineage. Nobles and clergy together possessed two-thirds of the land. Practically, the estimation in which a member of the French nobility was held depended not so much on the degree of his title as on its antiquity, and the distinction of those who had borne it. The higher titles of nobility were not borne by all members of a family; each son assumed a title from one of the family estates—a custom productive of no small confusion. Unlike 'roturier' lands, which divided among all the children equally, noble fiefs went to the eldest son. The Revolution overthrew all distinction of ranks. On 18th June 1790 the National Assembly decreed that hereditary nobility was an institution incompatible with a free state, and that titles, arms, and liveries should be abolished. Two years later the records of the nobility were burned. A new nobility was created by the Emperor Napoleon I. in 1808, with titles descending to the eldest son. The old nobility was again revived at the Restoration. All marquises and viscounts are of pre-revolution titles, none having been created in later times.

Commercial pursuits have more or less in different countries been considered incompatible with nobility. In England this was less the case than in France and Germany, where for long a gentleman could not engage in any trade without losing his rank. A sort of commercial 'Bürger-Adel,' or half-gentleman class, was constituted out of the patrician families of some of the great German cities, particularly Augsburg, Nuremberg, and Frankfort, on whom the emperors bestowed coats-of-arms. In semi-feudal Italy there was on the whole less antagonism between nobility and trade than north of the Alps. The aristocracy of Venice had its origin in commerce; and, though untitled, they were among the most distinguished class of nobles in Europe. On the other hand, in Florence, in the 14th century, under a constitution purely mercantile, nobility became a disqualification from holding any office of the state. In order to the enjoyment of civil right, the nobleman had to be struck off the rolls of nobility; and an unpopular plebeian was sometimes ennobled in order to disfranchise him. A little later there grew up, side by side with the old nobility, a race of plebeian nobles—as the Medici—whose pretensions were originally derived from wealth, and who eventually came to be regarded as aristocrats by the democratic party.

The nobility of Spain boasts of a special antiquity and purity of blood, a descent from warriors and conquerors alone. 'Hidalgo' (q.v.) is a term which implies gentility or nobility; the hidalgo alone has in strictness a right to the title 'Don,' which has latterly been used by persons who have no proper claim to it about as extensively as 'Esquire' in England. The higher nobility are styled Grandees (q.v.); the class of nobility below them are called 'Titulados.' Red blood is said to flow in the veins of the hidalgo, blue in that of the grandee. The preservation of noble blood, untainted by plebeian intermixture, has often been reckoned a matter of much moment. In Spain most of all this purity of lineage has been jealously guarded. In the German empire no succession was allowed to feus holding immediately of the emperor, unless both parents belonged to the higher nobility. In France the offspring of a gentleman by a plebeian mother was noble in a question of inheritance or exemption from tribute, but could not be received into any order of chivalry. Letters of nobility were

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sometimes granted to reinstate persons in this position. In Norway titular hereditary nobility was abolished in 1821; in Sweden it still survives. It is in Germany still important for many purposes to possess eight or sixteen quarterings—i.e. to be able to show purity of blood for four or five generations, the father and mother, the two grandmothers, the four great-grandmothers, and also, in case of the sixteen quarterings, the eight great-great-grandmothers, having all been entitled to coat-armour. Among the higher grades of the peerage in England a considerable number may be pointed out who do not possess this complete nobility.

See the works of May, Hallam, Stubbs, and Herbert Spencer; Sir H. Nicolas's *Historic Peerage* (1825; new ed. by Courthope, 1856); Freeman's *Comparative Politics* (1873); also the Peerages of Debrett (since 1802); Burke (since 1826), and J. Foster (since 1880).

Noble, a gold coin first minted by Edward III., and so called from its being of noble metal: on the one side was a ship, in allusion to Edward's victory at Sluys. The original value was half a mark, or 6s. 8d. A later issue (Edward IV.) bore a rose on the same side as the ship, and were called *rose-nobles* and *ryals*. Silver having depreciated, the value of the noble rose to 10s. (much greater purchasing value than now), and a new coin of the old value was issued, called the *Angel* (q.v.).

Nocera, an episcopal city of South Italy, 8 miles NW. of Salerno. Pop. 12,522.

Noctiluca (lit., 'night-light'), a phosphorescent marine Infusorian, extremely abundant round British and other coasts, one of the chief causes of the 'phosphorescence' of the waves. It is a spherical animal—large for an Infusorian ($\frac{1}{25}$ in. in diameter)—and moves by means of a long stout lash or flagellum, beside which there is a second, very much smaller, lying in the 'mouth' region. Its substance is remarkably spongy, and the phosphorescence is said by Allman to have its seat just underneath the rind. See INFUSORIA, PHOSPHORESCENCE.

Nocturn. See BREVIARY.

Nocturne ('night-piece'), a dreamy musical piece, generally for the piano, especially associated with the names of Field (q.v.), its inventor, and Chopin. See MUSIC, p. 358.

Nodal Lines. See HARMONICS, SOUND.

Noddy (*Anous*), a genus of birds of the family Laridæ, differing from terns in having the bill slightly angular, thus exhibiting an approach to

Noddy (*Anous stolidus*).

gulls, and the tail not forked, but somewhat wedge-shaped. Altogether seven species are enumerated, widely distributed throughout the tropics and in the temperate zones. One species (*A. stolidus*) has been recorded as found off Wexford and in Dublin Bay, but no specimens other than the two obtained there have been taken in the British Isles or on the Continent. It is a familiar bird in the Atlantic and Pacific Oceans, not unfrequently alighting on vessels and suffering itself to be taken by the hand; and so at its breeding-places also, where, not accustomed to the visits of man, it scarcely gets out of the way, and the female sits undisturbed on the nest. Hence it commonly shares with the booby the reputation of unusual stupidity. It is about 15 or 16 inches long, from the tip of the bill to the end of the tail, the general colour being a brownish black. The food consists chiefly of small fish and molluscs. Particular islands seem to be specially selected as the breeding-places of noddies, among them being the Bahamas, many of the Keys of the West Indies, the Laccadives, St Helena, Ascension, and many islands of Polynesia and Australia. Their nests, which are built on shelves of rocks or patches of sand or on trees, are sometimes very closely placed together. Each nest generally contains only one egg, which is about two inches long and of a buff colour, sparsely speckled with reddish brown. The eggs are very good to eat, and in some places are collected in large numbers. The other species of noddy are distinguished by their smaller size and slightly different colour.

Nodes, in Astronomy, are the two points in which the orbit of a planet intersects the plane of the ecliptic, the one through which the planet passes from the south to the north side of the ecliptic being called the *ascending node* (☊), and the other the *descending node* (☋). As all the bodies of the solar system, whether planets or comets, move in orbits variously inclined to the ecliptic, the orbit of each possesses two nodes, and a straight line drawn joining these two points is called the *line of nodes* of each body. It is scarcely necessary to add that as the earth moves in the plane of the ecliptic she has no nodes. The places of the nodes are not fixed points on the plane of the ecliptic, but are in a constant state of fluctuation, sometimes *advancing* (eastward), and at other times *receding* (moving westward). This motion is produced by the mutual attractions of the planets, which tend to draw each of them out of the plane of its orbit; and it depends upon the relative positions of the planets with respect to another planet whether that planet's nodes shall advance or recede. On the whole, however, the majority of possible 'relative positions,' or *configurations*, as they are called, is in favour of a retrograde motion; and we find by observation that in an average of many revolutions round the sun a constant retrogradation of the node takes place. The determination of this retrogradation in the case of the planets is a most complicated problem, as the separate action of each on the others has to be taken into account. The revolutions of the planetary nodes are accomplished very slowly, never amounting to as much as a single degree in a century. The nodes of the lunar orbit retrograde with much greater speed under the disturbing influence of the sun. It is owing to the fact that they complete a revolution in nearly eighteen Julian years and eleven days that series of eclipses regularly recur in that period. See ECLIPSES, ORBIT, PERTURBATIONS; and Herschel's *Outlines of Astronomy*.

Nodes, in Botany. See STEM.

Nodier, CHARLES, a considerable French writer, was born at Besançon, 29th April 1780 (Sainte-Beuve), in 1781 (Weiss), or even 1783 (Quérard), the son of a revolutionist lawyer. He lived a shifty life at Paris, Besançon, Dôle, Laibach, and last

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again at Paris, where he was appointed in 1823 to the librarianship of the Bibliothèque de l'Arsenal. As a child an ardent Jacobin, he became a royalist at the Restoration, was elected to the Academy in 1833, and died 27th January 1844. He was a devoted student of entomology, philology, and bibliography, but his importance in literature depends mainly upon the influence his personality exerted on the group of Romanticists of 1830. Most of his literary work is already forgotten, save his delightfully fresh and fantastic short stories, of which may here be named *Smarra*, *Histoire du Roi de Bohême et de ses sept Chateaux*, *La Fée aux Miettes*, *Inès de las Sierras*, *La Légende de Sœur Béatrix*, *Franciscus Columna*, and his volume of Fairy-tales. His *Souvenirs de Jeunesse* (1832) must not be taken too seriously. The *Œuvres Complètes* (12 vols. 1832–34) are far from complete. There are Lives by Wey (1844) and Mme. Ménessier-Nodier (1867). See also Mérimée's admirable *éloge*.

Noé. See CHAM.

Noetians. See PATRIPASSIANS.

Nogent-le-Rotrou, a town in the French department of Eure-et-Loir, prettily situated on the Huisne, 93 miles by rail SW. of Paris. It is a long, well-built place, with the ruined château of the great Sully, his violated sepulchre, and a statue of General Saint-Pol, who fell before Sebastopol. The Germans here won two fights, on 21st November 1870 and 6th January 1871. Pop. 7346.

Noisseville, a village of France, 5 miles E. of Metz, where, on 31st August and 1st September, Bazaine attacked the German besiegers of Metz with 120,000 men and 600 guns. He had some success on the first day, against the 41,000 men and 138 guns commanded by Manteuffel; but on the second day gave up the attempt to break through the German line, which had been reinforced during the night by 30,000 men and 162 guns.

Nola, an episcopal city of Italy, 16 miles ENE. of Naples. It is built on the site of one of the oldest cities of Campania, founded by the Ausonians, and taken by the Romans in the Samnite war, 313 B.C. Augustus died here, 14 A.D. Pop. 7496.

Noli me tangere. See LUPUS, TUBERCLE.

Nollekens, JOSEPH, was born in London, 11th August 1737, the son of a painter from Antwerp. Being placed in the studio of Scheemakers the sculptor, he made such progress that the Society of Arts repeatedly awarded him valuable prizes. In 1760 he settled in Rome. Garrick, whom he met there in the Vatican, immediately recognised his countryman as the young sculptor to whom the prizes had been awarded by the Society of Arts, sat to him for his bust, and paid him handsomely for it. He also executed in Rome a bust of Sterne in terra cotta, which added greatly to his reputation. After residing ten years in Rome he returned to London, where he set up his studio; and the reputation he had acquired in Rome was such that he immediately had full employment, and within a year after (in 1771) was elected an Associate of the Academy, and a Royal Academician the following year. His forte was in modelling busts; and through them he has handed down the likenesses of most of the important personages who figured in Great Britain in the end of the 18th and at the commencement of the 19th century—of Samuel Johnson, who was his friend and frequent visitor, of Fox, Pitt, and other political characters. George III. also sat to him. Besides busts, Nollekens executed numerous commissions for public monuments and statues. He also executed a number of classical and mythological statues and groups. He died in London, 23d April 1823, leaving no children to inherit a fortune of £200,000. See J. T. Smith's *Nollekens and his Times* (1828).

Nolle Prosequi, a term used in English law to denote that the plaintiff does not intend to go further with the action.

No Man's Land, a name applied to outlying districts in various countries, especially at one time to what now corresponds mainly to Griqualand East (q.v.), and also to a territory of 80,000 sq. m. in South Australia.

Nom de Plume, somewhat doubtful French for *nom de guerre* or Pseudonym (q.v.).

Nominalism, a famous controverted doctrine of the middle ages, respecting the nature of our general or abstract ideas, or of 'universals.' It was contended by some that abstractions—as a circle in the abstract, beauty, right—had a real existence apart from round things, beautiful objects, right actions. This was called Realism. Those who held the opposite view were called Nominalists, because they maintained that there is nothing general but *names;* the name 'circle' is applied to everything that is round, and is a general name; but no independent fact or property exists corresponding to the name. Specifically the controversy was as to the existence of 'universals' or of genera and species, and arose out of a passage in the Latin translation of Porphyry's *Isagoge*. The watchwords of three schools were *universalia ante res*, 'the universals before the concrete things,' of Platonic Realism; *universalia in re*, 'the universals in the thing,' held to be Aristotelian Realism; *universalia post rem*, 'the universals after the thing,' covering both Nominalism (that the universals were but *flatus vocis*, sounds) and Conceptualism (that the universals had an existence in the mind of the thinker).

Scholastic Realism of what was regarded as the Aristotelian type prevailed until the 11th century, when Roscelin defended a distinctly Nominalistic doctrine. Unhappily he applied his philosophy to the doctrine of the Trinity, and arrived at a tritheistic heresy, which (and Nominalism with it) was condemned by the church. Henceforward Nominalism carried with it, not unreasonably altogether, a savour of heresy and rationalism, and Realism was dominant, though the controversy raged throughout the 12th century. Abelard was a modified Realist; Albertus Magnus, Aquinas, and Duns Scotus were Realists of a kind, though in the 13th and 14th centuries the feud between Nominalists and Realists was no longer the central debate of scholasticism. Nominalism triumphed with William of Ockham (died 1347), with whom scholasticism may be held to have begun to dissolve. See SCHOLASTICISM, and works quoted there; the articles on the chief mediæval thinkers; the article PHILOSOPHY; and monographs by Exner (1841), Köhler (1858), and Löwe (1876).

Non-combatants. See COMBATANTS.

Non-commissioned Officers, in the British army (*sous-officiers* in the French, and *unteroffizieren* in the German), form a most valuable and important class, intermediate between the commissioned officers and the men. It is essential that some persons in authority should live amongst the men, superintend their Mess (q.v.), teach them their drill and duties, take charge of small parties on duty and in the field, and, generally, overlook them in every way. None are so well fitted to do so as those who are selected from amongst the men themselves, after several years' service as private soldiers, for promotion to non-commissioned rank. They must be well qualified by good conduct, tact, temper, education, and knowledge of military

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duties—in the two last mentioned they must pass examinations—and the efficiency of the corps will largely depend upon the way in which they do their duty. Besides extra pay, they enjoy special privileges, and many obtain commissions as officers. All quartermasters and riding-masters, all officers of the Coast Brigade Royal Artillery and Coast Battalion Royal Engineers, and many combatant officers of cavalry and infantry are selected from amongst them. They can only be reduced to the ranks, or to a lower grade, by sentence of a court-martial, and cannot be subjected to any minor punishment except a reprimand. The following are included in the term 'non-commissioned officer:' master-gunners, 3d class (who have charge of the armament and magazines in a fort), staff-clerks, all Sergeants (q.v.), Corporals (q.v.), and Bombardiers (q.v.). Sergeants have a separate Mess (q.v.), and in most barracks there is a corporals' room. The proportion of non-commissioned officers to other soldiers in a battalion at war strength is 91 to 959; in a regiment of cavalry, 83 to 551; and in a battery of artillery, 21 to 149. The following are warrant officers, a class ranking above non-commissioned officers, from whom they are nearly all selected, but below officers: Bandmasters, schoolmasters of more than twelve years' service, conductors of supplies or stores, master-gunners (1st and 2d class), superintending clerks, 1st class staff-sergeants, sergeant-majors, and corporal-majors. For the Navy, see PETTY OFFICERS, WARRANT OFFICERS.

Nonconformists, a name sometimes given generally to all sectaries who, at any period in English history since the establishment of Protestantism, have refused to conform to the doctrine and practices of the Episcopal Church. It is used in a restricted sense to denote the clergy who in 1662—two years after the Restoration—left the Church of England rather than submit to the conditions of the Act of Uniformity. In 1727 the Presbyterians, Independents, and Baptists received some special legal recognition, and came to be known as the Three Denominations. See ENGLAND (CHURCH OF), PRESBYTERIANS, INDEPENDENTS, &c.

Non-effective (Fr. *non-activité*) is the term used to describe the status of officers of the British army or navy who are on retired or half-pay. Non-commissioned officers and men who are discharged, die, or desert are also said to become 'non-effective.'

Nones. See CALENDS.

Nonius Marcellus, a Latin grammarian, of whose life nothing is known. Little can be made of his surname *Tuburticensis*, but at least we may date him later than the middle of the 2d century, as he frequently copies A. Gellius, and earlier than the sixth, as he is frequently quoted by Priscian. His name is attached to a treatise in eighteen chapters, without arrangement or critical sagacity, but precious as preserving many words in forgotten senses, and passages from books of ancient Latin authors now lost. A good edition is that by Gerlach and Roth (1842); see also Professor Nettleship's *Essays in Latin Literature* (1885). A collation of the Harleian MS. of Nonius, by the late J. H. Onions (1852–89), was published in 1892 in the Clarendon Press *Anecdota*. The last seven years of this brilliant young scholar's life were devoted to preparing an edition of the text of Nonius Marcellus for the Clarendon Press.

Nonjurors, the name given to that portion of the clergy in both England and Scotland who, having taken the oath of allegiance to James II., refused at the Revolution to take it to William and Mary. An act of parliament required them all to take this oath by 1st August 1689, six months' grace being allowed before deprivation; but it was refused by Archbishop Sancroft of Canterbury, by Bishops Ken of Bath and Wells, Turner of Ely, Frampton of Gloucester, Lloyd of Norwich, White of Peterborough, Thomas of Worcester, Lake of Chichester, and Cartwright of Chester (the three last died during the year), and by about 400 of the English clergy. In Scotland, where all the bishops refused the oath, Episcopacy was abolished in 1689, and more than 300 clergymen were thrust out; and not till the death of Prince Charles Edward in 1788 did the Protestant bishops in Scotland, 'upon mature deliberation with their clergy, unanimously agree to comply with and submit to the government of King George III.,' nor until four years later did the bill for their relief receive the royal assent. South of the Tweed the schism was perpetuated by the consecration in 1694 of Hickes (q.v.) and Wagstaffe as suffragan bishops of Thetford and Ipswich, in 1713 of Jeremy Collier (q.v.) and two others, as also by the introduction in 1718 of the 'usages' (a new communion office, prayer for the dead, mixed chalice, &c.). Thereby, however, for some thirteen years the Nonjurors themselves were split into two bodies, both ordaining bishops, till the dispute was terminated by the general adoption of the 'usages.' A fresh breach occurred through the consecration in 1733 of Roger Lawrence by a single Scotch bishop; and this branch supplied some adherents to the rebellion of the '45, in which none of the regular body were involved. For, High Churchmen as were all the Nonjurors, and believers in the doctrine of passive obedience, it is a great mistake to imagine that they were all Jacobites, or, at anyrate, active Jacobites; while, on the other hand, there were many active Jacobites who were not Nonjurors (for instance, Atterbury). Robert Gordon, the last of the regular Nonjuring bishops, died in 1779; Booth, the last of the irregular Nonjuring bishops, in 1805; and James Yeowell, probably the very last Nonjuror, long the sub-editor of *Notes and Queries*, in 1875. Nonjurors, not mentioned already, were Thomas Baker, Carte, Hearne, William Law, Charles Leslie, and Robert Nelson (q.v.).

See JACOBITES, and works there cited; Lathbury's *History of the Nonjurors* (1845); and Abbey and Overton's *English Church in the Eighteenth Century* (2d ed. 1887).

Non Nobis Domine. See GRACE AT MEALS.

Non Possumus (Lat., 'we cannot'), a papal formula taken from Acts, iv. 20 (Vulgate), and said to have been used by Pope Clement VII. in reply to Henry VIII.'s demand for the dissolution of his marriage with Catharine of Aragon; used in general expression for the refusal of the Roman curia to yield to the demands of the temporal power.

Non-residence. See PLURALISM.

Non-suit is a legal term in England, which means that, where a plaintiff in a jury trial finds he will lose his case owing to some defect or accident, he is allowed to be non-suited, instead of allowing a verdict and judgment to go for the defendant. But there is now, in general, no difference between the effect of a non-suit and that of a verdict for the defendant.

Non-user. See DESUETUDE.

Nootka Sound, a harbour on the west coast of Vancouver Island, British Columbia, its entrance protected by an island of the same name.

Norbertines. See PREMONSTRATENSIANS.

Nord, the most northerly department in France (whence its name), corresponding with the former province of French Flanders, and bordering on Belgium and the Strait of Dover. Area, 2193 sq. m.; pop. (1881) 1,603,259; (1886) 1,670,184. It is

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composed of two parts, or at least contracts near the middle at Armentières, on the Lys, to a very narrow strip. It is watered by the Scheldt and the Sambre, with their affluents, and by numerous canals. Next to that of the Seine, it is the most densely-peopled department in France; two of its cities have more than 100,000 inhabitants (Lille and Roubaix), and five more than 30,000. In blood the people are Flemish and Walloon in about equal proportions; some 177,000 still speak Flemish. The soil is fertile, well cultivated, and yields more abundant harvests than any other part of the country; the fisheries are productive, the mineral wealth very great, especially in coal; and for its manufacturing industries Nord is in several respects the foremost of French departments—iron, machinery, porcelain, glass and mirrors, paper, candles, soap, chemicals, beet-sugar, and cotton, woollen, linen, and silk cloths being all made on a large scale. It is abundantly equipped with railways and navigable streams. The department possesses five fortresses of the first class, and has been the scene of many great campaigns and battles. The arrondissements are Lille, Douai, Cambrai, Valenciennes, Avesnes, Hazebrouck, and Dunkirk. The chief town is Lille, the chief port Dunkirk.

Nordenham. See BREMERHAVEN.

Nordenskiöld, BARON NILS ADOLF ERIK, Arctic navigator, was born at Helsingfors in Finland, on 18th November 1832. He acquired a taste for mineralogy, geology, chemistry, and similar sciences from his father, the head of the mining department of Finland, and studied them further at the university of his native town and at Berlin. In 1857 he naturalised himself in Sweden, and in the following year was appointed head of the mineralogical department of the Royal Museum at Stockholm. During the next twenty years he frequently visited Spitzbergen; in 1864 he completed the measurement of an arc of the meridian there, and mapped the south of the island. After two preliminary trips to the mouth of the Yenisei, by which he proved the navigability of the Kara Sea, he successfully accomplished (June 1878—September 1879), in the celebrated *Vega*, the navigation of the North-east Passage, from the Atlantic to the Pacific along the north coast of Asia. On his return he was made a baron of Sweden (1880), and during the next five years published the results of the journey in *Voyage of the Vega round Asia and Europe* (Eng. trans. 2 vols. 1881), *Scientific Results of the Vega Expedition* (1883), and *Studies and Investigations* (1885). To Greenland, too, he has made two expeditions; members of his party on the second occasion (1883) reached a point 140 miles distant from the east coast, but without finding the ice-free interior Baron Nordenskiöld believed to exist. Three years later he published a book on the icy interior of Greenland. In 1891 he proposed to lead an expedition to the Antarctic polar region, the expense being borne in part by the Australian colonies. For biographical details, see A. Leslie's *Arctic Voyages of A. E. Nordenskjöld, 1858–79* (1879).

Norderney, a small treeless island, lying 3 miles off the coast of the Prussian district of East Friesland, and forms one of a string of islands that line that coast. Area, 4 sq. m.; pop. 2850. It enjoys a great reputation for sea-bathing, and in summer may have 13,000 or 14,000 visitors.

Nordhausen, a flourishing town of Prussian Saxony, pleasantly situated at the southern base of the Harz Mountains, and the west end of the fertile *Goldene Aue* ('golden plain'), on the Zorge, 48 miles by rail NNW. of Erfurt. St Blasius, one of its seven churches, contains two paintings by Cranach; and there are also a quaint town-hall, seventy extensive distilleries of corn-brandy or 'Nordhäuser schnaps' (11,000,000 gals. per annum), and manufactures of tobacco, sugar, leather, chemicals, &c. Dating from 874, and in 1253 created a free imperial city, Nordhausen embraced the Reformation in 1522, and in 1803 fell to Prussia. Pop. (1875) 23,570; (1890) 26,744. See works by Förstermann (1825–55), Lesser (1860), and Girschner (1880).

Nördlingen, a town in the west of Bavaria, is situated on the river Eger, 44 miles NW. of Augsburg by rail. It has a Gothic church (restored 1880), with a high tower and fine organ, and manufactures carpets. Here took place, 6th September 1643, the great battle in which the Swedes were defeated by the Imperialists with a loss of 12,000 killed and wounded. Pop. 8095.

Nore is a sandbank in the estuary of the Thames, 3 miles NE. of Sheerness and 47 from London. Off its east end is the floating light, which revolves 50 feet above high-water. The name is commonly applied to the portion of the estuary in the vicinity of the Nore light and sandbank. It was here that the outbreak of the fleet, known as the 'mutiny at the Nore,' broke out on 20th May and lasted until 13th June 1797. The ringleader, Richard Parker, who had styled himself President of the 'Floating Republic,' was hanged on the 30th from the yardarm of his ship; and a few other men soon afterwards executed or flogged through the fleet. *The King's Own*, by Marryat, gives a sketch of the mutiny.

Norfolk, an important county on the east coast of England, oval in shape, and in size yielding only to Yorkshire, Lincolnshire, and Devonshire, is bounded N. and NE. by the North Sea, SE. and S. by Suffolk, and W. by Cambridgeshire, Lincolnshire, and the Wash. With an extreme length and breadth of 66 miles by 42, it has an area of 2119 sq. m. or 1,356,173 acres. Pop. (1801) 273,371; (1831) 390,000; (1881) 444,637; (1891) 456,474. Its coast-line, upwards of 90 miles in length, is for the most part flat, and skirted by low dunes, except near Cromer, and again at Hunstanton, where cliffs, from time to time undermined by the sea, rise to a height of from 100 to 200 feet. Inland the surface is undulating, well timbered, and well watered, the principal rivers (by which, and by the Great Eastern and Eastern and Midlands Railways communication throughout the county is kept up) being the Ouse, which flows northward to the Wash, and the Bure, Yare, and Waveney, which fall into the sea near Yarmouth, and in their course link together the numerous Broads (q.v.) situate in the north-eastern district. The soil consists chiefly of light loams and sands—in places there are extensive rabbit-warrens, and with so much wood (51,258 acres in 1889) there is naturally an abundance of game. The climate, though in the spring-time cold owing to the prevalence of east winds, is on the whole dry and healthy. Apart from lime, chalk, and excellent brick-earth, no minerals of any importance are worked, but agriculture in all its different branches is here brought to the highest state of perfection: all the usual crops, especially turnips, swedes, and mangold, are extensively cultivated; upwards of 3400 acres are occupied as market-gardens and orchards; whilst great attention is paid to the rearing of turkeys and geese for the London markets, and on the rich marsh-lands in the extreme west of the county, as well as on the pastures bordering the various rivers, great quantities of cattle are grazed. The principal manufactures are noticed under NORWICH, and of other industries the most important is the herring-fishery connected with

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Yarmouth and other ports. Norfolk comprises 33 hundreds, the city of Norwich, the municipal boroughs of King's Lynn, Great Yarmouth, and Thetford (parts of the two latter extending into Suffolk), and 736 civil parishes with parts of 9 others, mostly in the diocese of Norwich. Its parliamentary divisions are six in number, each returning one member, and the county council consists of 76 members. Towns other than the foregoing are Dereham, Diss, Downham Market, North Walsham, Swaffham, and Wymondham. In the history of the county the most notable incidents have been the settlements within its borders of the Flemish refugees and Walloons in the reigns of Henry I., Edward III., and Queen Elizabeth; and Ket's rebellion (1549). Many interesting traces of the handiwork of its former occupants are still extant in the ruins of priories at Castle Acre, Thetford, and Walsingham, in the castles of Norwich, Castle Rising (where Queen Isabella was confined a prisoner), and Caistor, in earthworks at Buckenham, Caistor, and Thetford, and in the old halls of Blickling (the home of the Boleyns), Holkham, Houghton, Oxburgh, and East Barsham. Among Norfolk 'worthies' (omitting those noticed under Norwich) are to be found the names of Gonville (founder of the college at Cambridge which bears his name), Sir John Fastolf, the Earl of Surrey, Sir Thomas Gresham, Skelton and Shadwell (poets-laureate), Sir Edward Coke, his descendant the Earl of Leicester, Spelman (the antiquary), Sir Roger L'Estrange, Sir Cloudesley Shovel, Sir Robert Walpole and his son Horace, Blomefield (the topographer), Tom Paine, Windham (the statesman), William Godwin, Lord Nelson, Professor Porson, Manby (inventor of life-saving apparatus), Sir Astley Cooper, Elizabeth Fry, Fowell Buxton, Lord Cranworth, Captain Marryat (the novelist), Cattermole (the painter), Borrow (the Romany Rye), Bulwer Lytton, and Rider Haggard. For the Dukes of Norfolk, see HOWARD.

See the county histories by Blomefield (11 vols. 1805–10), Chambers (2 vols. 1829), Rye (1885), and White (new ed. 1890); also A. D. Bayne's *Eastern England* (2 vols. 1873), G. C. Davies' *Norfolk Broads and Rivers* (1884), and Jessopp's *Arcady* (1887).

Norfolk, a city and port of entry of Virginia, on the right bank of the Elizabeth River, 8 miles from Hampton Roads, and 33 miles from the ocean. The city is irregularly built on low ground, and contains a city hall, mechanics' and masonic halls, custom-house, military academy, and Catholic seminary. Its large deep harbour is defended by Fort Calhoun and Fortress Monroe. A government navy yard, dry-dock, and hospital are at Gosport, a naval suburb of Portsmouth, on the opposite bank of the river. Norfolk ships considerable quantities of cotton, oysters, and early fruits and vegetables; lines of steamers connect it with New York and other cities, and three canals end here. The town was burned by the British in 1776. For the engagement between the *Merrimac* and the *Monitor*, fought off Norfolk, see NAVY. Pop. (1880) 21,966; (1890) 34,871.

Norfolk Island lies in the Western Pacific, about half-way between New Zealand and New Caledonia, 400 miles NNW. of the former. The coasts are high (mean altitude, 400 feet) and steep, and the surface generally uneven, rising in Mount Pitt to 1050 feet. The island is 6 miles long, and has an area of 13½ sq. m. The soil is fertile and well watered, and the climate healthy. The Norfolk Island Pine grows to a height of 200 feet; the Norfolk Island Cabbage is a dwarf pine. Norfolk Island was discovered by Cook in 1774. Between 1788 and 1805, and again between 1826 and 1855, it was a penal settlement for convicts sent from New South Wales. In 1856 many of the inhabitants of Pitcairn Island (q.v.) were transferred hither by the British government. In 1888 the pop. was 741. This includes about 150 Melanesian boys and girls being educated at Bishop Patteson's mission-station of St Barnabas, Norfolk Island being the headquarters of the diocese of Melanesia, which was founded in 1861. The people govern themselves, under the superintendence of the government of New South Wales; they fish, farm, and supply provisions to passing vessels.

Norham Castle, the Border fortress of the Bishops of Durham, on the right bank of the Tweed, 8 miles SW. of Berwick. Founded in 1121, and deemed impregnable in 1522, it has memories of Kings John, Edward I., and James IV., but is known best through *Marmion*. The picturesque ruins comprise a great square keep, 70 feet high. See Hubert Jerningham's *Norham Castle* (1883).

Nor'icum, a Roman province, situated between Rhætia on the west and Pannonia on the east, and corresponding to the present states of Austria proper south of the Danube, Styria, Carinthia, and part of Salzburg. The Roman emperor Drusus subdued the native Celtic Norici or Taurisci in 15 B.C. The name survives in the Noric Alps; see ALPS.

Normal Schools, or TRAINING-COLLEGES, institutions where teachers are instructed in the principles of their profession and trained in the practice of it. See EDUCATION, Vol. IV. pp. 211, 217.

Norman Architecture, a style originated and chiefly used by the Normans. Soon after their conquest of the north of France they began to erect churches and cathedrals in memory of their victories; and, not contented with the small churches then common in France, they desired to erect monuments worthy of their great conquests. They accordingly expanded the dimensions, while to a great extent retaining the style of the buildings they found in the north of France; though they seem also to have borrowed some of their ideas from the Rhine (see GOTHIC ARCHITECTURE).

The leading characteristics of their style were size and massiveness. They adopted the old Latin plan (derived from the Basilica) of central and side aisles; and at the east end they invariably placed a semicircular apse. They seized on the tower as a distinguishing feature, and developed it as their style progressed. The ornaments are simple and of great variety, but the most common and distinctive are the zigzag, billet, chevron, nail-head, &c. The windows and doors are simple, with semicircular arched heads—the former without tracery. The tympanum of the door-arch is occasionally filled with sculpture. The nave-arches are carried sometimes on single pillars, but more frequently, especially as the style advanced, on piers with shafts. The shafts are almost always recessed in nooks (or 'nook shafts'). Owing to the great size of the buildings the architects were unable at first to vault the main aisle, which, accordingly, had usually a wooden roof, the side aisles only being vaulted. The masonry is rude, the joints being large, and the stones generally unhewn. The style prevailed from about the beginning of the 10th century till the death of William the Conqueror, near the end of the 11th century. There are many examples in Normandy, the churches at Caen being well-known buildings of the date of William.

This style of architecture was brought into England by the Normans at the Conquest, 1066. They there extended the scale of the buildings, as they had done in Normandy, preserving, however, many local peculiarities of the Saxon style, which

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they found in the country. The chapel of St John, on the second floor of the White Tower of London, is the earliest example of pure Norman work in England, that ancient keep having been built by William the Conqueror in 1078. There are, however, many buildings, both in England and Scotland, which date from before the end of the 12th century, when the pointed style began to be used; Durham, Lindisfarne, Canterbury, Dunfermline are partially Norman, besides many other churches and castles. The Anglo-Norman is heavier than the French-Norman, the cylindrical nave piers of the English buildings being much more massive than those of French works. To relieve this heaviness the chevron, spiral, and other groovings were cut in the piers. The mouldings and forms of doors and windows are the same as those of Normandy. There is one remarkable difference in the plans of the Early Norman churches in the two countries: in France the apse at the east end is always semicircular, but in England this form was gradually given up, and towards the end of the style the square east end was generally adopted.

St John's Chapel, Tower of London.

Normanby, a town in the North Riding of Yorkshire, 3½ miles SE., and mainly within the parliamentary boundary, of Middlesborough. Pop. 9114. It has given the title of marquis in 1694 to John Sheffield (q.v.), Earl of Mulgrave and afterwards Duke of Buckinghamshire, as also in 1838 to Constantine Henry Phipps (1797–1863), previously Earl of Mulgrave, and a distinguished statesman.

Normandy, formerly a province of France, lying along the seaboard of the English Channel, between Brittany and French Flanders, its eastern boundaries being marked by the little rivers Eu and Epte, and its western by the Couësnon. In area it corresponded approximately to the modern departments of Seine-Inférieure, Eure, Orne, Calvados, and Manche, its capital being Rouen. It is on the whole a fertile region, with well-cultivated fields and many smiling orchards, filled with apple-trees, from the fruit of which cider is made. The people are intelligent and industrious, and rank amongst the best and most energetic of French provincials. When the Romans were masters of Gaul this portion of the country formed part of *Gallia Lugdunensis Secunda;* after the Franks' invasion it made a constituent part of the kingdom of Neustria, and was given by Charles the Bald to the Duke of Paris. From the middle of the 9th century its coasts were harried by the vikings or sea-rovers of the north (see NORTHMEN); shortly after the 10th century began they established themselves in such force along the Seine that Charles, king of the Western Kingdom, was glad to make a definite agreement with their leader Rolf (Rollo, Rou) at Clair-sur-Epte in 912. Rolf, Duke of the Northmen, became the vassal of the king, but wrested his lands from the Duke of Paris, and consequently had him for an enemy all his life. Rolf at the same time became nominally a Christian, taking at his baptism the name of Robert. His successor was his son William Longsword, who declared himself King Charles's vassal in 927. His father had conquered lands to the west of those originally granted to him; William added the Cotentin, or peninsula of Manche, and thus extended the duchy westwards to Brittany and the sea. This he seems to have done partly with the help of new-comers from the north, who settled there. Thus there were striking differences between eastern and western Normandy: the former rapidly adopted Christianity, the French language (*langue d'oïl*), and the manners and customs of the French, whilst the newer districts stuck sturdily to their heathen faith and customs and their native Norse tongue. Open war was waged between the rival parties not only during the lifetime of William, but in the reign of his son and successor, Richard the Fearless (943–996), who only overcame the heathen and Scandinavian party with the help of King Louis and the Duke of Paris. Louis then attempted to make himself master of Normandy—Richard being a youth—but was frustrated by Hugh of Paris, who now sided with the Normans. In 987 Hugh became king of the Western Kingdom of France; and the good understanding established between Normandy and France lasted from that time down to the accession of William, the Conqueror of England. Richard the Good, son of Richard the Fearless, began to rule in 996, and, dying in 1026, left his son Richard as his successor. It was during his reign that Nortmannia began to be substituted for Land of the Northmen; hence Normandy and Normans. The second Richard's sister Emma married, first Ethelred of England, and second Canute (Knut) of Denmark and England; this knit the first close ties between the ruling families of England and Normandy. The third Richard was succeeded after a reign of two years by his brother Robert, who died on his way back from a pilgrimage to Jerusalem in 1035, leaving as the heir to his duchy his natural son William, at that time a boy. During William's minority the duchy was the scene of anarchy and confusion. The western portion made an attempt to assert its independence, an attempt crushed by William with the help of the king of France at Val-ès-Dunes (1047). The next twenty years are written glorious in the annals of Normandy. William ruled with vigour and prudence; he fostered the noble houses, but kept a firm hand on the nobles; encouraged the churches, yet preserved the control of church matters himself; thoroughly established the feudal system; gave countenance and support to learning (Lanfranc, Anselm); and favoured the building of magnificent abbeys. He also waged war with the Count of Anjou, his southern neighbour, for the county of Maine, and conquered it in 1063; and even fought against the king of France, who

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gave assistance to rebels against William's rule. After the conquest of England (q.v.) Maine revolted and had to be subdued again, William's son Robert rebelled against him in Normandy, and a war broke out with France, in which William (q.v.) lost his life. The incapable Duke Robert mortgaged his duchy to his brother William Rufus, and went crusading to the East. After his return he was defeated and imprisoned by his brother Henry I., who ruled Normandy till his death (1135), notwithstanding the efforts of Robert's son William to dislodge him. After the accession of Stephen in England Matilda's husband, Geoffrey of Anjou, gradually made himself master of Normandy (1139–45), but after reigning five years he resigned it to his son, afterwards Henry II. of England. Richard I. and John were the next dukes. But the duchy was taken away from John by the king of France (1203–4), on the plea that as the murderer of his nephew Arthur he (John) had forfeited his French fiefs. The claim to the title was, however, only formally renounced by Henry III. in 1259. Twice subsequently Normandy was in English hands: Edward III. conquered it in 1346, and Henry V. in 1417–18; but the English were finally driven out in 1450. The Channel Islands (q.v.) are a remnant of the Norman possessions still belonging to the descendants of the Norman kings of England. For map, see France in provinces; for the Norman-French and Anglo-Norman literature, see English Literature, Vol. IV. p. 366; France, Vol. IV. p. 785; and Romance Languages.

Customary Law of Normandy.—The duchy was governed by customary law, which grew up principally out of local usages; at first it was the same as the customary law of England. Even down to the present day the law administered in the royal courts of the Channel Islands is virtually the old customary law of Normandy. One feature survives in the Cry of Haro (q.v.). This ancient customary law of Normandy seems to have been collected in writing on three separate occasions. The earliest collection was apparently written down by private persons in 1200 and about 1220, and had no official character; the third collection (1585) is a revised edition of the second, the *Grand Coutumier*, completed early in the 14th century. See Sir Travers Twiss in *Academy*, 24th June 1882.

See Freeman, *Norman Conquest* (5 vols. 1877); Palgrave, *History of Normandy* (4 vols. 1878); Planché, *The Conqueror and his Companions* (1874); Spence, *Dreamland in History* (1890); and topographical works by Blackburn (1869) and K. Macquoid (1874).

Normanton, a town in the West Riding of Yorkshire, by rail 3 miles NE. of Wakefield and 10 SE. of Leeds, an important railway junction, and seat of coal-mining and iron-working. Pop. 8038.

Norns, the *Parcæ* of Scandinavian mythology, were three maidens, by name Urd, Verdandi, and Skuld—i.e. Past, Present, and Future. They sit by the well of Urd, under the world-tree Ygdrasil in Asgard, and there determine the fate both of gods and men. Besides these three there are many inferior norns, both good and bad, answering to the genii of classical mythology; to such are attributable the unequal destinies of men in the world. Women who possessed the power of prediction or magic also bore this name.

Noronha, Fernando, a group of small islands belonging to Brazil, in the South Atlantic, about 200 miles ENE. of Cape San Roque. The group, which comprises a main island, 6½ miles long and about 2 broad, and several smaller islets, is of volcanic character, phonolite and other rocks of late formation resting on a foundation of basalt. A curious calcareous sandstone is also common, consisting of sand and fragments of shells, rendered firm by the action of water. The climate is healthy, and the trade-winds keep the temperature moderate. The islands are fertile, and maize, sugar, sweet potatoes, cassavas, melons, and bananas are raised. The low hills and valleys of the main island are thickly wooded; a sort of fig (*Ficus noronhæ*), like the Banyan (q.v.), drops aërial roots from its branches. The group was visited in 1775 by Captain Cook, and in 1832 by Darwin, who investigated its geology. The *Challenger* Expedition explored the smaller islands. The main island has been made a penal settlement, where about 1500 convicts are kept, guarded by 200 soldiers.

Norristown, capital of Montgomery county, Pennsylvania, on the left bank of the river Schuylkill (crossed by three bridges to Bridgeport), 17 miles by rail NW. of Philadelphia. It contains a fine marble court-house, a state asylum for the insane, a number of cotton-mills and woollen-factories, rolling-mills and foundries, flour-mills, and manufactories of glass, tacks, &c. Pop. (1880) 13,063; (1890) 19,790.

Norrköping, the first manufacturing town of Sweden after Stockholm, stands at the head of the Bråvik, 113 miles by rail SW. of Stockholm, and is a well-built modern town. First founded in 1384, it has been several times destroyed by fire. The rapid river Motala, which connects Lake Vetter with the Bråvik, and which is spanned by several substantial bridges, affords considerable water-power, by which the numerous manufactories are worked. Here are cloth-mills, cotton spinning and weaving, manufactures of sugar, paper, tobacco, &c., and shipbuilding (gunboats, &c.). Here Charles IX. (1604) and Gustavus IV. (1800) were crowned. Pop. (1886) 28,993.

Norse. See Iceland, Saga, Scandinavia, Northmen.

North, a family famous in the history of England, the most illustrious members of which were three of the sons of Dudley, fourth Baron North of Kirtling in Cambridgeshire, all of whose lives fortunately were written by their youngest brother Roger, who has also bequeathed to posterity an interesting and characteristic, but unfinished, autobiography. These have all been collected by Dr Jessopp (3 vols. 1890).—Sir Edward North (1496–1564) was famous as a lawyer, and was created Baron North of Kirtling in Cambridgeshire in 1554. His second son was Sir Thomas North, of whose life we know but little save that he was still living in 1603 when the third edition of his translation of Plutarch (first 1579) was published. This work, a translation from the French of Amyot, remains a noble monument of English, and was beyond doubt one of the fountains from which Shakespeare drew his knowledge of ancient history. There is an admirable edition of the portions relating to Shakespeare by Professor Skeat (1875). Other translations by North were *The Diall of Princes*, from a French version of Guevara (see Euphuism), and *The Morall Philosophie of Doni*, from the Italian (1570; new ed. by Joseph Jacobs, 1888).—Charles, the eldest son of the fourth Baron North, was created Lord Grey of Rolleston, but on the death *s.p.* of his son, William, sixth Baron North (1734), the barony of Grey ceased, and that of North devolved upon his cousin, Francis, third Baron Guilford. He was created Earl of Guilford in 1752, and his son, the second Earl of Guilford and eighth Lord North, was the famous statesman under George III. The third earl had only three daughters, between whom the barony of North of Kirtling fell into abeyance on his lordship's death in 1802, until in 1841 it vested in Susan, Baroness North (1797–1884), whose son, William-Henry John, succeeded as

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eleventh Baron North in 1884. The other honours of the third earl devolved upon his brother, Francis, fourth earl; and next on another brother, Frederick, fifth earl; on whose death in 1827 the earldom reverted to his cousin, Francis, sixth earl; who was succeeded by his grandson, Dudley-Francis, seventh earl; and he in his turn, in 1885, by his son, Frederick-George, eighth Earl of Guilford.—Francis North, second son of Dudley, fourth Baron North, was born 22d October 1637. He had his education at Bury and St John's College, Cambridge, studied law at the Middle Temple, and was called to the bar in 1655. He worked hard, was judicious in his drinking, and more than prudent in his marriage, and was knighted and made Solicitor-general in 1671, and Attorney-general in succession to Sir Heneage Finch but two years later. In 1674 he became Lord Chief-justice of the Court of Common Pleas. As far from being the despicable creature of Macaulay's picture as the saint and sage of his brother's eulogium, he knew how to make interest for himself, and quickly became a privy-councillor, and in 1682 Lord-keeper of the Great Seal, and Baron Guilford (September 1683). We know of his love for music, his kindness to his brothers and sisters, his dislike of witchcraft trials, and his distrust of all the many plots of the time. After the king's death he was much vexed by the intrigues and insolence of Sunderland and Jeffreys, but soon after died, 5th September 1685.—Sir Dudley North, the third son, was born 16th May 1641, and, like his brothers, educated at Bury. Even at school he was a trader, and at an early age he was bound to a Turkey merchant in London. Ever the industrious apprentice, he yet solaced himself with cock-fighting and swimming. He made a voyage to Archangel, next to Smyrna, where he settled for some years in trade. Afterwards he settled in Constantinople, returning to England some years after with a considerable fortune, which he continued to increase by keeping an interest in the Levant trade. He became one of the sheriffs of London, and was pliant enough in the interest of the crown. He was knighted, married the widow Lady Gunning, and was appointed a Commissioner of Customs, next of the Treasury, then of the Customs again. Under James II. he sat in parliament for Banbury, and after the Revolution made but a sorry defence of his actions as sheriff. He was a keen-eyed observer of men and manners, had great mechanical genius, a passion for architecture, and quite extraordinary ability as a financier. Indeed, his *Discourses upon Trade* (1691) anticipate in a striking manner some of the ideas of Adam Smith. He died 31st December 1691.—Dr John North, the fifth son, was born in London, 4th September 1645, was educated at Bury, and entered Jesus College, Cambridge, in 1661, becoming fellow there in 1666. He was strangely timid, yet a severe student, solacing himself by book-buying and by keeping great spiders in wide glass bottles. He succeeded Barrow as Master of Trinity College in 1677, became clerk of the closet to Charles II., and died, after a long and grievous sickness, in April 1683.—Roger North, the sixth and youngest brother, was born at Tostock in Suffolk, 3d September 1653, educated at Bury and Jesus College, Cambridge, entered the Middle Temple, and under the influence of his brother the lord-keeper, soon rose to a lucrative practice at the bar. At the Revolution his hopes of advancement were closed, and he cast in his lot with the nonjuring party, and retired to his estate of Rougham in Norfolk, where he indulged the family passion for building, and acted as trustee for his great brother's estate at Wroxton. In 1696 he married, and lived henceforth the life of a country gentleman and virtuoso, his only unusual tastes being a passion for acquiring books, and for planting trees. He died 1st March 1734. His three hyper-eulogistic biographies, his autobiography, with all its naïveté of detail and its amusing prejudices, and his *Examen* (1740) of Dr White Kennet's *History of England* give him a place in English literature not quite commensurate with own merits.—Frederick North, eighth Lord North and second Earl of Guilford, a famous English minister, was born April 13, 1732, and educated at Eton and Trinity College, Oxford. When only twenty-two he entered the House of Commons, and was made a Lord of the Treasury in 1759, having inherited the Tory politics of his ancestors. On the death of Charles Townshend in 1767 he was made Chancellor of the Exchequer and leader of the House of Commons, a post for which he was well qualified by his eloquence, good-humour, wit, and readiness of resource, even against such antagonists as Fox and Burke. In 1770 he succeeded the Duke of Grafton as prime-minister. North was largely responsible for the measures that brought about the loss of America; as a minister he was too ready to surrender his own judgment to that of the narrow-minded and obstinate king. Indeed, North was called by Horace Walpole the *ostensible* minister; the *real* minister was George III. In 1778 he renounced the right of taxing the colonies, already seeing that the war was hopeless, and in 1782 he resigned. With North's retirement came to an end the king's scheme of governing the country by his own will, and ruling the House of Commons by thinly-disguised corruption. North was succeeded by the Marquis of Rockingham, on whose death Lord Shelburne became premier. Fox's dislike of the terms of peace with America led him to enter into a coalition with North, whom he had for so many years inveighed against as a minister without foresight, treacherous, vacillating, and incapable. North and Fox took office under the Duke of Portland in 1783, but the coalition destroyed Fox's popularity, and the Portland administration only lasted a few months. North was afflicted by blindness during the last five years of his life. He succeeded to the earldom of Guilford in 1790, on the death of his father, and died 5th August 1792.—Brownlow North, evangelist, was grandson of that Brownlow North (1741–1820), Bishop of Lichfield, Worcester, and Winchester, whose son succeeded in 1827 as sixth Earl of Guilford. Born at Chelsea, January 6, 1810, he spent six years at Eton, travelled abroad, gambled, and lived much in the north of Scotland, but underwent conversion in 1854, and thereafter devoted himself entirely to evangelical labours under the Free Church of Scotland, as well as in Ireland and England. He died at Tullichewan in Dumbartonshire, November 9, 1875. See his Life by K. Moody-Stuart (1878).

North Adams, a manufacturing village of Massachusetts, picturesquely situated on the Hoosac River, near the west end of the Hoosac Tunnel (q.v.), 143 miles by rail W. by N. of Boston. It has a large number of woollen and cotton mills, shoe and print-cloth factories, a foundry, &c. Pop. (1890) 16,074.

Northallerton, the capital of the North Riding of Yorkshire, 30 miles NNW. of York. It has a town-hall (1874); a fine cruciform church, Norman to Perpendicular in style; a cottage hospital (1877); and sites of a Roman camp and a Norman castle of the bishops of Durham. At Standard Hill, 3 miles N., was fought, on 22d August 1138, the great battle of the Standard, in which Archbishop Thurstan routed David I. of Scotland, and which got its name from the banners of SS. Peter, John of Beverley, and Wilfrid, hung

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out from a car in the English host (see FLAG, Vol. IV. p. 662). From 1640 to 1832 Northallerton returned two members, and then till 1885 one. Pop. 3802. See the *History of Northallerton* by Ingledew (1858), and that by Saywell (1886).

Northampton, the capital of Northamptonshire, and a county, parliamentary, and municipal borough, is seated on rising ground on the left bank of the river Nen, 66 miles NW. by N. of London and 50 SE. of Birmingham. It has a fine town-hall (1861–64), to which other municipal offices have more recently been added at a cost of £24,000; a county hall, noticeable for its decorated ceiling; corn exchange (1850); museum, free library, and schools of science and art (enlarged 1889); several large hospitals; a theatre (1884); infantry barracks (1797; rebuilt 1877–78); and thirteen churches, the most interesting of which are St Peter's (Norman), St Sepulchre's (Norman and Decorated, one of the few remaining round churches in England), All-Saints' (rebuilt subsequent to 1675, but with a fine west tower partly Norman), and St Giles' (cruciform). The principal manufacture is that of boots and shoes, the town being the English centre of that industry; a considerable trade is carried on in the dressing of leather, some lace is made, and extensive breweries are also in operation. On the outskirts of the town is a fine racecourse, on which meetings are held annually in April and November. Pop. (1801) 7020; (1831) 15,351; of the municipal borough (1891) 61,016, and of the parliamentary borough, which returns two members, 70,872.—Of the many stirring events of which Northampton has been the theatre, the principal are its burning by the Danes (1010); the rebuilding, and erection of its castle (of which no traces now remain) by one Simon de St Liz (*c.* 1075); its siege by the barons (1215), when garrisoned for King John; the establishment of its university (1260), which was abolished some few years later; the conclusion of a treaty (1318) by which the independence of Scotland was formally recognised; the holding of many parliaments; royal visits by Richard I. (in whose reign a royal mint was established here), John, Henry III. (who here received homage from Alexander II. of Scotland), Edward I., Queen Elizabeth, and Charles I.; a battle (10th July 1460) fought in the meadows below the town between Henry VI. and the Yorkists, in which the former was defeated and made prisoner; a visitation of the plague (1637), which in five months claimed 500 victims; the mustering here in 1642 of the parliamentary forces under Lord Essex on the outbreak of the Civil War; and a great fire (20th September 1675) which almost entirely destroyed the town.

Northampton, capital of Hampshire county, Massachusetts, stands near the west bank of the Connecticut River (here crossed by a bridge to Hadley), 103 miles by rail W. of Boston and 3 miles NW. of Mount Holyoke. It contains the state lunatic asylum, the Clarke Institute for deaf-mutes, a public library, housed in the handsome Memorial Hall, and Smith College for women. The manufactures are of importance, and include paper, silk, cotton and woollen goods, sewing-machines, cutlery, baskets, brushes, jet ornaments, &c. Pop. (1880) 12,172; (1890) 14,990.

Northamptonshire, or NORTHANTS, a midland county of England, 67 miles long, and 25 where broadest, is surrounded by the counties of Rutland, Lincoln, Cambridge, Huntingdon, Bedford, Buckingham, Oxford, and Warwick. Area, 984 sq. m., or 629,912 acres, of which more than half is pasture. Pop. (1801) 131,757; (1841) 199,208; (1881) 272,558; (1891) 302,184. In the north-east near Peterborough the county is flat, and forms part of the Bedford Level (q.v.), but elsewhere the surface is undulating, the highest ground—about 800 feet above the sea-level—being found in the neighbourhood of Daventry. It is traversed by the London and North-Western, Midland, and Great Northern railways, and communication by water is maintained by the Nen and the Welland, which are the chief rivers, as also by the Grand Junction, Union, and Oxford canals. The soil, a black, peaty mould in the north-east, and a brown loam on the uplands, is on the whole very productive. Corn and green crops are largely grown, but, as compared with the previous year, the area of land devoted to those crops in 1889 showed a decrease of 9680 acres. On the broad pastures many cattle are grazed, and dairy-farming is carried on, but, although Northants is a great hunting county, the breeding of horses is not much encouraged. The principal minerals are limestone, which is quarried in the north-east, and ironstone of excellent quality, which is found near Kettering and Wellingborough; in 1889 the amount of ore produced was 1,257,080 tons, whilst 230,820 tons of pig-iron were made. The manufactures are inconsiderable apart from those noticed under Northampton. The county comprises twenty hundreds, the municipal boroughs of Brackley, Daventry, Higham Ferrers, Northampton, Peterborough, and Stamford (the last two extending into Huntingdonshire and Lincolnshire), and has in all 344 civil parishes, with parts of four others, almost entirely in the diocese of Peterborough. The parliamentary divisions are four, each returning one member, whilst the county council (exclusive of that for the Soke of Peterborough, which has forty members) numbers sixty-eight. In history the principal incidents connected with the county, omitting those noticed under Northampton (its capital), have been the battles of Edgecote (1469) and Naseby (1645), the beheading of Mary Queen of Scots at Fotheringay Castle (1587), and the imprisonment of Charles I. at Holmby House (1647). Of its natives, besides Richard III. and (perhaps) Catharine Parr, the best known are Archbishop Chichele (the founder of All-Souls' College at Oxford), Sir Christopher Hatton (the courtier), Catesby (of Gunpowder Plot renown), Thomas Fuller, James Harrington, Bishop Cumberland, Dryden, Charles Montagu, Earl of Halifax, William Law, Gill and Carey (the eminent Baptists), Doddridge (the Nonconformist), James Hervey, Cartwright ('the father of Reform'), Dr Paley, William Lisle Bowles, Clare (the peasant poet), the Earl of Cardigan (leader of the Balaclava charge), and Dean Mansel. See the county histories by Bridges (2 vols. 1791), Baker (2 vols. 1822–41), and Whellan (2d ed. 1874).—Hampshire (q.v.) is the county of *South*ampton.

North Berwick, a fashionable watering-place of Haddingtonshire, at the entrance to the Firth of Forth, 23 miles by a branch-line (1848) ENE. of Edinburgh and 10 by water SSE. of Elie in Fife. Behind it rises conical North Berwick Law (612 feet); and westward stretch splendid golf-links with an 18-hole course. Tantallon Castle, 3 miles E., fronting the Bass Rock (q.v.), is a magnificent ruin, finely described in Scott's *Marmion*. A stronghold of the Douglases, it resisted James V. in 1528, but in 1639 was 'dung down' by the Covenanters. Robert III. made North Berwick a royal burgh, and till 1885 it returned, with Haddington, &c., one member to parliament. Pop. 1991. See Ferrier's *North Berwick* (11th ed. 1890).

Northbrook. See BARING.

North Cape, the northernmost point in Europe, in 71° 10′ N. lat. It is not however on the continent, but on the island of Magerö. The northernmost point on the *continent* is Cape

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Nordkyn (71° 6′ N. lat.), 6 miles farther south than the North Cape, and some 45 miles to the east of it.

North Carolina, one of the thirteen original United States of America, is situated on the Atlantic seaboard, south of Virginia, in 33° 50′—36° 33′ N. lat., and 75° 27′—84° 30′ W. long. Its extreme length is about 500, its breadth 186 miles. Area, 52,250 sq. m., or larger than that of England.

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The eastern part of the state is low, and in some parts swampy, the central part undulating, and the western mountainous; but everywhere, except in limited areas in the eastern section, the soil is remarkably fertile and the climate salubrious. The highest mountains in the United States east of the Mississippi are in North Carolina, at least twelve peaks being higher than Mount Washington, in the White Mountains, and more than fifty exceeding 6000 feet in altitude—Mitchell's Peak (6707 feet) the highest. Most of these are clothed to their tops with thick forests, but some have prairie-like summits covered with deep turf. All this picturesque region, known as 'the Land of the Sky,' is a favourite resort in summer for southerners and in winter for northerners.

North Carolina is rich in mineral products. The value of its gold and silver deposited for coinage and assay from 1793 to 1891 exceeds $12,000,000. A branch U.S. mint was established at Charlotte in 1838, and has since 1873 been continued as an assay office. Silver occurs associated with lead in Clay and Davidson counties, and zinc in the latter county. Iron is widely disseminated in the form of specular ores, hematites, and magnetites; copper and plumbago also are found in many counties. Coal of excellent quality has been profitably mined in the vicinity of Deep River, and is abundant, too, near the Dan River. There are valuable deposits of corundum and extensive beds of mica in the west; and more than 150 species of gems, &c. are found in the state, including the rich 'hiddenite' or lithia-emerald, which is not known to occur elsewhere. Granite and marble abound in some localities, and there are valuable phosphate beds in the eastern section.

Maize has hitherto been the principal agricultural product, but has recently been rivalled by cotton in the annual value of its crop. Wheat, oats, hay, tobacco, and sweet potatoes are the next most valuable products of the soil. One of the chief industries in eastern North Carolina has long been the production of tar, rosin, and spirits of turpentine from the forests of long-leaved pine (*Pinus palustris*) and allied species. The manufacturing industries until 1880 were limited, but since that date the spindles and looms for the manufacture of cotton and woollen fabrics have been largely increased, tobacco-factories have been established and enlarged, and in 1888 the first silk-factory in the southern states was established. Fisheries constitute a profitable industry along the coast, and employ from 6000 to 7000 men.

North Carolina contains 96 counties, and returns nine members to congress. It has about 3000 miles of railway. The chief port and largest city is Wilmington, the capital Raleigh. Parts of the state are deficient in good schools, but there are excellent graded schools in the principal towns. Besides several denominational colleges, there is a state university (1795) at Chapel Hill, and a state agricultural college was established at Raleigh in 1889. There are asylums for the insane at Goldsboro, Raleigh, and Morganton—the first for negroes only; and provision is also made by the state for the blind and deaf-mutes, both white and black. The penitentiary has about 1300 convicts, but most of them are hired out by contract.

History.—In 1584 Raleigh's first expedition landed on Roanoke Island, and was kindly received. In 1585, 1586, and 1587 Raleigh planted colonies on the island, but the first returned with Drake in 1586, and the others were destroyed. In 1629 Charles I., claiming under Cabot's discovery, granted to Sir Robert Heath the territory, also claimed by Spain and called Florida, from lat. 30° to 36° as *Carolana Florida*. By the English it was called both Carolana and Carolina. In 1653 a colony from Virginia settled on the banks of the Roanoke and Chowan rivers: this was the first permanent settlement in North Carolina. In 1663 Charles II. granted the region across the continent between lat. 31° and 36° to eight of his favourites, under the name of Carolina. In June 1665 the king extended the limits of Carolina to 29° on the S. and to 36° 30′ N. The proprietors, 'to avoid erecting a numerous democracy' in Carolina, adopted a utopian form of 'fundamental constitutions,' prepared by John Locke and Shaftesbury, which recognised a nobility of landgraves and cassiques. The eldest proprietor was palatine, and the other seven had high-sounding titles. The proprietary rule ceased in 1729, when the king bought out the claims of the proprietors for £2500 each, and North Carolina became a royal province. Under the administration of the second royal governor, Gabriel Johnston (1734–53), the colony increased in population from 14,000 to 45,000, and became very prosperous. The arbitrary rule of Governor Dobbs (1754–66) and Governor Tryon (1766–73) served to intensify the dislike of the people to the taxation policy of parliament; and when the colonial assembly at Wilmington protested against taxation without representation it was dissolved by Governor Tryon. The Mecklenburg Convention met at Charlotte and adopted a declaration of independence on May 20, 1775. The early years of the war (1775–83) were marked by bitter local and partisan conflicts between Whigs and Tories. In the years 1779–81 North Carolina furnished about one-tenth of the American army; still, it was the last state but one to ratify the federal constitution, November 21, 1789. It was the last, too, of the eleven Confederate States to pass in convention an ordinance of secession, May 21, 1861, which was not submitted to the people. The capture of Fort Fisher in January 1865 led to the federal occupation of Wilmington, the advance of the union forces on Raleigh, and the surrender of General Johnston, which practically ended the war of secession. Pop. (1800) 487,103; (1840) 753,419; (1880) 1,399,750; (1890) 1,617,947—making North Carolina the sixteenth state in order of population. Presidents Jackson, Polk, and Johnson were natives; and Flora Macdonald (q.v.) for a time resided here.

Northcote, Sir Stafford. See Iddesleigh.

North Dakota, one of the two states constructed in 1890 out of the former territory of Dakota (q.v.).

Northern Territory. See South Australia.

North German Confederation. See Germany, Vol. V. p. 184.

Northmen, or Norsemen, the name given in the middle ages by the coast-dwellers of Germany, France, and England to the sea-rovers who came from the north—Denmark, Norway, Sweden. In a narrower sense the word sometimes means the inhabitants of Norway only. The most prominent characteristics of these North Teutonic tribes were their love for the sea and for war. Bolder navigators than even the Phœnicians of old, they sailed east, west, south, and even north into the Arctic Ocean, to indulge their passion for fighting, to win fame, to gain wealth, to plunder, and to slay. We

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nowadays should call them pirates; they called themselves sea-kings, vikings, and believed that these expeditions were the noblest and most honourable work they could put their hands to. They believed too that the best title, in the legal sense, to land and other (movable) property was given by winning it with the sword: this gained them the highest respect and influence, and was the surest guarantee of political power. There were likewise powerful economic and political causes co-operating with these to send forth, from the middle of the 8th century to the 13th, and even later, these thronging swarms of Northmen. The natural resources of the lands they dwelt in were very inadequate to the support of the relatively large populations. The system of land tenure, based on the indivisibility and absolute ownership of the family estate, whilst fortifying the sense of family attachment and fostering family pride, frequently imposed galling restraints upon the younger sons, especially the more restless and high-spirited among them. Hence they spent the summer in quest of fame and booty in distant lands; but generally came home again in the autumn, to pass the winter in the enjoyment of the good things they had earned. Still stronger impulses were given to these expeditions when the more powerful chiefs (kings) at home began to subdue their weaker contemporaries and rivals, and the separate kingdoms (Norway, Denmark, Sweden) began to take definite shape, under such strong rulers as Harold Fairhair (Haarfager) and Canute. Many of the free odal proprietors, rather than submit to become the feudal vassals of the conquerors, preferred to abandon their homes, and go and conquer new lands for themselves elsewhere. These strong rulers moreover sternly put down the intestine conflicts in which the Northmen delighted; consequently to get their fill of fighting they were obliged to go abroad.

A favourite plan of the weaker viking chiefs was to lie in wait up some small creek or river-mouth, or behind the shelter of some island, and thence suddenly dart out upon a passing vessel. The larger fleets boldly invaded a district, plundered the inhabitants, slew them if they offered resistance, or carried them off as slaves if they did not, harried the open country, rifled the churches and monasteries—which always yielded the greatest stores of gold and silver—and not infrequently burned them to the ground, as they did the strong cities they took and sacked. Being heathens, worshippers of Thor and Odin, they had no qualms of conscience as to sacrilege, and stood in no awe of the threatenings of the church. One viking fleet would even challenge another to fight it for fighting's sake only. The vessels they sailed in were comparatively small and light of draught, so that they were able to penetrate a long way up the rivers, sometimes into the heart of a country; and as the Northmen were resistless in arms and unrelenting in their wrath, their mere appearance was often sufficient to paralyse an entire district with panic terror. In many churches a special petition, 'From the fury of the Northmen, O Lord, deliver us,' was recited in the litany. But these sea-rovers were also keen traders: on many occasions they first requested permission to land and trade peacefully with the inhabitants, and only when their trading was done did they begin to plunder. There were several recognised trading-places along the shores of the Baltic, and some on the North Sea, which were visited not only by legitimate merchants from England, Flanders, Italy, the East, but also by vikings who had slaves, and gold and silver, and other less valuable booty to dispose of.

The viking age is divisible into two periods: during the first adventure and plunder were the chief incitements—this lasted until the middle of the 9th century; the second was the period of permanent conquests, in Ireland, France, England, South Italy. The sea-rovers made their first recorded attack upon England, upon Wessex, in 787, and first began to raid along the shores of Frisia, Flanders, and France towards the end of the century. These bands came from Denmark, but may nevertheless have been Norwegians. During the first half of the next century the depredations of the Northmen were more terrible than ever, especially in Frisia and Flanders, during the periods 834–837 and 845–850. They had also gone farther south: in 820 a band reached Aquitaine; fifteen years later another band plundered the French island of Noirmoutier; in 843–844 a fleet sailed up the Loire and Gironde, visited Galicia (Spain), and steered up the Guadalquivir and fought the Moors. From about the middle of the century bodies of Northmen established themselves in permanent camps at the mouths of the French rivers, and repeatedly ascended them on their errands of plunder and slaughter. Three times in quick succession they took Paris and stripped it of its wealth (845, 857, 861); but the most famous siege took place in 885–886. In 859 and 860 an exceptionally adventurous fleet entered the Mediterranean, ravaged the coasts of Spain and Mauretania, and Majorca, spent the winter at the mouth of the Rhone, and in the following summer laid their ruthless hand on the coast towns of Italy, especially on Luna (near Carrara), thinking it was Rome. Yet Flanders and the north of France suffered most during the thirty-six years from 876 to 912. During all this period a large army, or even armies, dominated the coast districts from the Rhine to Brittany, quartering themselves in entrenched camps, and not only routing time after time the armies of the weak kings of Austrasia and Neustria, and their still weaker vassals, but even making disastrous raids far into the interior—to Coblentz, Soissons, Sens—and extorting from kings, dukes, counts, and towns large sums in gold and silver as the price of abstaining from hostilities. The chiefs of these formidable bands were Björn Ironside, Hasting, Siegfred, Godfred, and Rollo or Rolf. Detachments of the main body crossed over more than once to England, where, however, Alfred was a match for them. Rollo (Rou) is probably the same as Rolf the Ganger; if so, he was the son of a chief of the west coast of Norway, and was outlawed by Harold Fairhair shortly after 872. In 912 Charles the Simple of France, seeing that it was hopeless for him to drive away his dangerous and pertinacious foemen, thought it best to disarm them against himself, and at the same time arm them against new-comers, by allowing them to settle in his kingdom, a plan adopted by other rulers before. Accordingly at Clair-sur-Epte he agreed to cede to Rollo the district bounded by the Channel, the Seine, and the Epte, on condition that he would become his man or vassal, and be baptised a Christian. Rollo accepted the terms, and thus acquired the nucleus of the duchy of Normandy (q.v.). There the name Northmen was softened into Normans, a name celebrated in history not only in virtue of the conquest of England by Duke William, but also because of their exploits in Italy and Sicily, and the East, described under GUISCARD and SICILY.

The earliest serious attacks upon England were made in 793 and 794, when Lindisfarne and Jarrow monastery were sacked and Northumberland ravaged. It was about the same time that the sea-kings of Norway began to cross the 'Western Sea' and sail as far as the Syderöer or South Islands—i.e. the Hebrides, the Western Isles of Scotland, and Man (q.v.)—and to Ireland, prob-

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ably utilising the Faroe (q.v.) and Shetland (q.v.) Islands as resting-stages. They sacked Iona (Hy) in 802 and again in 806, slaying most of the monks. Their visits to Ireland were particularly numerous after 807, and brought great woes upon the unhappy island. A chief named Torgisl, a Norseman, conquered most of north Ireland shortly after 840. In or a little before 852 a fleet of Danes arrived and disputed fiercely with the Norsemen, or, as the Irish called them, the Eastmen; but in the year quoted Olaf the White of Norway founded the Scandinavian (chiefly Danish) kingdom of Dublin, which lasted three centuries or more, whilst two of his followers created the separate kingdoms of Waterford and Limerick (see IRELAND, Vol. VI. p. 203). The Faroe, Orkney, and Shetland Islands seem to have been frequently visited by Norsemen after 825, and were permanently colonised during the next quarter of a century. Iceland (q.v.) was discovered and colonised by the same people between the middle and end of the century; and from Iceland they ventured still farther west, and made settlements in Greenland (q.v.), and even visited Vinland (q.v.) in North America. The viking raids on England were incessant after 833, but were checked for a time by the great slaughter inflicted on them by Ethelwulf at Ockley (Surrey) in 851. Fifteen years later they began again, and this time assumed the character of a serious invasion, the invaders being almost exclusively Danes. They made themselves absolute masters of the northern, and more especially the eastern, portions of the island, notwithstanding the heroic efforts of Alfred and his son Edward. The struggle is sketched under England (q.v.).

By the middle of the 8th century the Norwegians had discovered the sea-route to the White Sea by rounding the North Cape. On several occasions down to 1222 they sailed up the Northern Dwina and plundered the people of Bjarmeland or Permia. The most important event in viking history on the east side of the Baltic happened in 862. The Slav (perhaps rather Germanic Russi) tribes who dwelt south of Lake Ladoga as far as the Southern Dwina invited three Scandinavian chiefs (probably from Sweden), brothers, of whom Rurik became the most influential, to go and rule over them. They established themselves at Holmgaard (Novgorod) and laid the foundations of the kingdom of Gardarike, out of which grew the subsequent Russia (q.v.), that was ruled over by Rurik's descendants down to 1598. Contemporaneously with this two other Scandinavian chiefs formed the nucleus of another state at Könugaard (Kieff); and, sailing thence down the Dnieper, they threatened Constantinople, which was only saved by a sudden storm scattering the fleet of the Northmen or Värings (Varangians), as they were called by the Slavic Russians and the Greeks. Three times during the first half of the 10th century these adventurers appeared before the capital of the Eastern empire, and on two occasions (907 and 945) went away carrying with them heavy sums, the price paid by the emperors to save the city from assault. Igor, the son of Rurik, who commanded two of these expeditions, even launched his fleet on the waters of the Caspian, and carried the terror of the Northmen's name among the Mohammedan dwellers on its shores. The expeditions of the Värings gradually ceased after Vladimir introduced Christianity into his dominions in 988. Nevertheless for many years these Scandinavian rulers in Russia surrounded themselves with stout and trusty warriors from the north, their position being precisely analogous to that of the Manchu emperors in China. From the end of the 10th century the emperors of Constantinople had, till the fall of the city in 1453, a picked bodyguard of Varangians. The men of the north esteemed it a high honour to have served in this chosen cohort at Myklegaard (i.e. 'the Great City'); and doubtless they carried back to their countrymen at home many elements or traits of the civilised refinement of the Byzantine court. After the Norman Conquest of England large numbers of English Northmen made their way to Constantinople and enlisted in the Varangian guard; these were the only men whose battle-axes cost Robert Guiscard and his Normans trouble at the great battle of Dyrrhachium (1082).

See Steenstrup, *Normannerne* (4 vols. 1876–82); G. Storm, *Kritiske Bidrag til Vikingetidens Historie* (1878); Munch, *Det Norske Folks Historie* (7 vols. 1852–63); Keary, *Vikings in Western Christendom, 789–888* (1891); Du Chaillu, *Viking Age* (2 vols. 1890); Barlow, *History of Normans in South Europe* (1886); Count Schack, *Normannen in Sicilien* (2 vols. 1889); Delarc, *Les Normands en Italie* (1883); also the older books Worsaae, *Danes and Norwegians in England, &c.* (1852); Strinnholm, *Wikingatåge* (2 vols. 1839–41); Wheaton, *History of Northmen* (1831); and Depping, *Histoire des Expéditions des Normands* (2 vols. 1826). See also the books quoted under NORMANDY, and the articles IRELAND, NAMES, SHIPBUILDING. For the language, see ICELANDIC; and see also SCANDINAVIAN MYTHOLOGY.

North Sea. The North Sea, or German Ocean, is a southern extension of the Arctic Ocean (q.v.). It communicates freely with that part of the Arctic Ocean lying between Iceland and Norway which has received the name of the Norwegian Sea. Its northern boundary would be represented by a line drawn from the Shetland Islands to the opposite coast of Norway, and its southern boundary is the Strait of Dover; on the west it is bounded by the east coast of Great Britain, and on the east by the coasts of Norway, Denmark, Germany, Holland, and Belgium. With the North Atlantic Ocean it has communication through the Strait of Dover and the English Channel on the south, and on the north by the Pentland Firth and the channel between the Orkney and Shetland Islands; with the Arctic Ocean as already stated; and with the Baltic by the Skagerrack and Cattegat. The North Sea is over 600 miles in length and about 400 miles in greatest width, and its area is estimated at over 160,000 sq. m. By far the greater proportion of this area is less than 100 fathoms in depth, the only part where deeper water is found being off the coast of Norway (the Norwegian Gully or Norwegian Deep, as it has been called), where a depth of 360 fathoms has been recorded; the mean depth of the whole area is estimated at 61 fathoms. The sea is very shallow towards the south and east, and the coasts in this direction are low and flat, being in some places below the level of the sea, whereas to the north and west, where the water is deeper, the seacoast is high, and the deep Norwegian Gully is faced by the high and bold cliffs of Norway. The sea-bottom is very irregular, a number of banks running across from the Yorkshire coast towards the Skagerrack, the most important of which is the Dogger Bank (q.v.), and there are also depressions like the Silver Pit; off the low-lying coasts of Holland, Belgium, and Britain there are numerous shoals and sandbanks formed of the materials brought down by the rivers. The North Sea is surrounded by continental land and receives the waters of numerous rivers, the principal of which are the Thames, Ouse, Humber, Tyne, Tweed, Forth, and Tay, the Scheldt, Rhine, Weser, and Elbe. The deposits forming on the bottom consequently belong to the class called 'terrigenous,' consisting in the shallower water of sands and gravels and in the deeper water of muds and clays,

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containing stones and fragments of rocks and minerals derived from the land, along with calcareous fragments of shells and other organisms.

The salinity of the water of the North Sea varies between 1·025 and 1·027, the lightest water occurring in the southern part and in the Skagerrack, where fresh water comes from the Baltic, and the densest water at the bottom in the deep water off Norway. The mean temperature of the air over the North Sea in summer is about 60° F., and in winter about 36°, the range throughout the year being about 34°—from 31° to 65° F. Except in the summer months, the temperature of the surface water is higher than that of the air, the mean temperature of the surface water in summer being about 58°, and in winter about 42° F. The winds are variable over the North Sea, the most prevalent being from the south-west, and the currents are chiefly dependent on the direction of the wind; fogs, mists, and rain occur at all seasons. The great tidal wave of the Atlantic advancing from the west is divided into two portions on striking the British Islands: the one entering the North Sea round the Orkneys and through the Pentland Firth, the other coming up the English Channel. Captain Tizard, R.N., who has made a special study of the tides in the North Sea, says: 'The former undulation seems to run along the east coast of Britain like a wave along a breakwater, and makes it successively high-water along the coast from Duncansbay Head to Orfordness; the latter undulation runs along the coasts of France, Belgium, Germany, &c., and finally ends at the Scaw. As the distance from the coast increases, the rise and fall seems to diminish until it is probable that in the centre of the sea there is very little if any. Captain Hewitt found one spot midway between the British and Dutch coasts where there was no rise and fall. The tidal streams do not depend on the times of high and low water at the different ports, but seem to be more dependent on the position where the maximum rise and fall takes place, running towards that spot when the tide is rising there and away from it when falling there; I have not worked it all out yet, but certainly on the east coast from St Abb's Head to the Wash the stream is always running to the southward when the tide is rising in the Wash and to the northward when falling there. From Cromer to the Downs the tide is affected greatly by the undulation from the Channel, and the two undulations seem to pass through each other; but there is a very curious fact in connection with the two tides—viz. all the light-vessels in the North Sea affected by the Channel tide rotate with the hands of a clock, and all affected by the tide round the Orkneys rotate against the hands of a clock.'

The North Sea has been from the earliest times one of the most important highways of the world, and is surrounded by some of the most prosperous commercial nations, famous for their maritime exploits. The fisheries of the North Sea are among the most important in the world, providing employment for thousands of fishermen from the surrounding countries; all the varieties of food-fishes abound, as well as edible molluscs and crustaceans, such as oysters, mussels, lobsters, crabs, and shrimps. The value of these fisheries depends to a great extent upon the abundance of the fauna and flora living on the sea-floor, all the various groups of invertebrates being met with in great profusion in the North Sea, while the surface waters swarm with algæ, such as diatoms, &c., which sometimes form extensive floating banks.

See North Sea Pilot and Admiralty publications; also *Expedition zur physicalisch-chemischen und biologischen Untersuchung der Nordsee im Sommer 1872* (Berlin, 1875).

Northumberland, the most northern county of England, separated from the Lowlands of Scotland by the Tweed, and from the county of Durham by the Tyne and Derwent. The German Ocean bounds it on the E., and the county of Cumberland, with a part of Roxburghshire, on the W. Among the English counties it ranks fifth in regard to size, having an area of 1,290,312 acres. Its greatest length is 70 miles and its greatest breadth 47 miles. The surface of the county, except near the coast, is picturesquely broken into rounded and conical-shaped hills and high moorland ridges. The main valleys are fertile and well wooded. The principal heights belong to the Cheviot Hills (q.v.), and are seated in the north-west part of the county. These are Cheviot (2676 feet), Hedgehope (2348 feet), Cushat Law (2020 feet), Bloody Bush Edge (2001 feet), and Windy Gyle (1963 feet). The Simonside Hills near Rothbury attain a height of 1447 feet. The chief rivers are the Tyne (formed by the confluence of two streams, the North and South Tyne, a little above Hexham), the Wansbeck, the Coquet, the Aln, the Breamish, the Till, and the Tweed. In the south-west of the county are some small sheets of water called the Northumbrian Lakes, the largest of which is Greenley Lough. Off the coast lie a few islands—Lindisfarne or Holy Island, the Farne Islands, and Coquet Isle. The geology of the county is simple in its broad features. The beds as a whole slope to the sea, the direction of the general dip lying between south-east and east; hence the oldest rocks—the Silurian—appear in the north-west, near the head of the Rede and Coquet, and the later formations—the Triassic and Permian beds and the coal-measures—near the coast. The strata have been dislocated and broken by volcanic disturbances, during which were intruded the igneous rocks. The Cheviots, which cover an area of 200 sq. m., owe their origin to the earlier of these upheavals. They consist chiefly of andesites and porphyrites. The Whin Sill, a great sheet of basalt stretching across the county from Kyloe near Berwick to Greenhead in Cumberland in a series of columnar crags, was injected among the sedimentary rocks during the later eruptions which took place, it is supposed, at the close of the Carboniferous period. A number of basaltic dykes also cross the county. The coal-measures occupy the south-east part of the county, and the lead-measures (belonging to the Upper Limestone series or Yoredale rocks) the south-west.

The climate is cold, especially from March to the middle of June, when the prevailing winds are from the east and north-east. The winters, however, are often much milder than they are in the south. The average rainfall, too, except in the Cheviot district, is considerably less than in the counties of Devon, Dorset, Hampshire, and Sussex. Northumberland contains 541 civil parishes, and, ecclesiastically, is in the province of York. For the purposes of civil government the county is divided into nine wards (answering to hundreds or wapentakes), three of which formed part of Durham till 1844. It comprises four parliamentary divisions—the Tyneside, Wansbeck, Hexham, and Berwick-upon-Tweed, returning four members. The principal towns are Alnwick, Morpeth, Hexham, and North Shields. Newcastle-upon-Tyne (q.v.) is a city and county of itself. A large portion of the county is agricultural, especially the fertile tracts along the principal valleys and near the coast. The usual rotation of crops is oats, turnips, and a small quantity of potatoes, spring wheat and barley, clover and other grasses, and then pasture. Turnips grow well, the cultivation of them on raised ridges being peculiar to the county, and known as the Northumbrian system. The western portion of the county is pastoral, the slopes of the Cheviots

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affording sustenance to large flocks of hardy sheep. In Chillingham Park there is preserved a herd of wild cattle said to be of the original British stock. The staple trade of the county is in coal, and the chief manufactures are connected with its mining and transit. The number of collieries working in the county is about 114. The salmon-fisheries of the Tyne and Tweed have long been famous. The county is traversed by the North-Eastern and North British railways. Pop. (1801) 168,078; (1841) 266,020; (1881) 434,086; (1891) 506,096.

Northumberland in the time of the Romans was inhabited by a branch of the Celtic people, the tribe of the Ottadeni. In the 6th century it was conquered and colonised by the Angles. It then formed part of the kingdom of Bernicia. Being a border county, it suffered much during the Scottish wars, and from the 11th to the 17th century was frequently the scene of much bloodshed. The battles of Otterburn, Homildon Hill, and Flodden were fought on its soil. Northumberland is very rich in memorials of the past. No county, indeed, has a more interesting collection of military antiquities, from the rude circular camps and entrenchments of the old inhabitants to the great castles and peel-towers of mediæval times. The Romans have left a mighty monument of their power in the great barrier erected across the southern portion of the county, and in the stations and roads connected with it. Other antiquities, also noticed separately, are at Bamburgh, Dunstanburgh, Hexham, Alnwick, Holy Island, Norham, &c. Northumberland is the birthplace of Bishop Ridley, Thomas Bewick, Akenside, Lord Eldon, George and Robert Stephenson, Grace Darling, the second Earl Grey, Birket Foster, and Lord Armstrong.

Works treating on the history, antiquities, geology, &c. of the county are: the Histories of Wallis (1769), Hutchinson (1778), Mackenzie (1825), and Hodgson (1820–40); Hodgson Hinde's *General History of Northumberland*, an addition to Hodgson's great work (1858); Hartshorne's *Feudal and Military Antiquities of Northumberland* (1858); Gibson's *Northumbrian Castles, Churches, and Antiquities* (1848–54); Bruce's *Roman Wall* (1874); Lebour's *Geology of Northumberland and Durham* (1886); Tomlinson's *Comprehensive Guide to Northumberland* (1888); the *Proceedings* of the Society of Antiquaries of Newcastle-upon-Tyne, and the Surtees Society.

Northumbria, the most northern of the ancient English kingdoms, stretching from the Humber northwards to the Firth of Forth, and separated westwards from Cumbria and Strathclyde by the Pennine range and the Ettrick Forest. Bernicia, the district north of the Tees, had for its first king Ida (547–559), who built Bamburgh as his capital. His grandson, Ethelfrith, mounted the throne in 593, and having married the daughter of Ella, who in 560 had formed the kingdom of Deira out of the district between the Tees and the Humber, set aside the rights of his boy brother-in-law Edwin, and so united both Bernicia and Deira into one kingdom. But the ousted Edwin, returning to defeat and slay the usurper in 617, thereupon himself became king of the Northumbrians as well as Bretwalda. Under him Northumbria was Christianised. In 633 he fell in battle against Penda of Mercia and the Welsh Cadwallon, but a year later St Oswald, son of Ethelfrith, cleared the country of the invaders, and united both divisions under his rule. His brother and successor, Oswy, was forced to yield Deira to Oswin, son of Osric, his cousin, but in 654, by a great victory in which Penda perished, was able anew to unite his kingdom, and reigned till 670 the most powerful of all Northumbrian kings. Under later kings—Egfrid (670–685), Aldfrid (685–705), a great patron of learning, and as many as fourteen obscure successors, most of whom came to a violent end—Northumbrian influence gave way before the rise of Mercia, internal tumults, and Danish ravages, until 806, when the chroniclers cease to give a regular succession of kings, and 827, when at length Northumbria became tributary to Egbert. See the Histories of Green, Skene, and Freeman.

North-western Provinces, a lieutenant-governorship of British India, constituted under an Act of 1835, and occupying the upper basin of the Ganges and Jumna, extending from Bengal to the Punjab. Oudh, till 1877 a separate government, is now under the lieutenant-governor of the North-western Provinces, but in some respects has separate institutions. The province, which constitutes the great part of Hindustan proper, is mainly a great alluvial plain, sloping from the Himalayas, and comprises the Doab, Rohilkhand, Bundelkhand, &c., and the Upper Ganges valley. It is the great wheat country of India, but is not on a level with Bengal as to resources or trade. The headquarters of Hinduism, and containing some of the most sacred memorials of the Aryan race, it was nevertheless long subject to Moslem sway; and in 1881 13·4 per cent. of the population were Mohammedans, as compared with 86·3 per cent. Hindus. The divisions of the North-western Provinces are Meerut, Agra, Rohilkhand, Allahabad, Benares, Jhansi, Kumaon, and the four divisions of Oudh—Lucknow, Sitapur, Fyzabad, Rai Bareli. Total area under direct British administration (with Oudh), 106,111 sq. m.; pop. (1881) 44,107,869. The native states have a further area of 5125 sq. m., and a pop. (1881) of 741,750. With the native states the area is about the size of Italy, and the population is larger. If we exclude the Himalayan districts, the population is denser than England and Wales. The capital is Allahabad. See INDIA, OUDH.

North-west Passage, a route for ships from the Atlantic to the Pacific by the north of America. The *North-east Passage* is that by the north of Asia. See POLAR EXPLORATION, ARCTIC OCEAN, FRANKLIN (SIR JOHN), NORDENSKIÖLD.

North-west Territories. See CANADA, Vol. II. p. 690, and the articles on ALBERTA, ASSINIBOIA, ATHABASCA, and SASKATCHEWAN.

Northwich, a market-town of Cheshire, on the river Weaver and the old Watling Street, 18 miles ENE. of Chester. Underneath the town and all around it are great numbers of brine-springs, which have been used for the preparation of salt since before the Christian era. The town is being gradually undermined by the pumping of the brine, and the cavities so formed have caused many houses and buildings to fall. Several of those that still stand are propped up or bolted together. The streets are narrow and irregular, and many of the dwelling-houses are of an antique type. In 1670 rock-salt mines began to be worked, and now great quantities of this mineral are extracted. The town was taken by the parliamentarians in 1643. Pop (1881) 12,246; (1891) 14,914.

Norton, ANDREWS, American theologian, was born at Hingham, Massachusetts, December 31, 1786, graduated at Harvard in 1804, was appointed mathematical tutor there in 1811, and in 1813 librarian of the university and lecturer on biblical criticism and interpretation. In 1819–30 he was Dexter professor of Sacred Literature. Norton was among the most distinguished exponents of Unitarianism, equally determined in his protest against Calvinism and in his opposition to the school of Theodore Parker and the naturalistic theology. His chief writings are *Reasons for not believing the Doctrines of Trinitarians* (1833), and

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two works on *The Genuineness of the Gospels*. He died at Newport, Rhode Island, September 18, 1853, leaving also a translation of the gospels, which was edited (1855) by Dr Ezra Abbot and his son, CHARLES ELIOT NORTON, who was born at Cambridge, Massachusetts, 16th November 1827, and graduated at Harvard in 1846. He travelled in India and Europe in 1849–51, and again in Europe in 1855–57 and 1868–73, and in 1864–68 was joint editor with Lowell of the *North American Review*. He has published a number of works relating to Italy, and edited Carlyle's letters (see bibliography at CARLYLE).

Norton, THE HON. MRS. Caroline Sheridan, poet and novelist, was born in 1808, the second of the three beautiful granddaughters of Richard Brinsley Sheridan. One of her sisters became Lady Dufferin, the other Duchess of Somerset; and she herself in 1827 married the Hon. George Chapple Norton (1800–75). She bore him three sons, of whom Thomas Brinsley (1831–77), the second, succeeded to the title of fourth Lord Grantley; but the marriage proved a most unhappy one, and her friendship with Lord Melbourne (q.v.), whom she first met in 1831, led her husband to institute five years afterwards a groundless and unsuccessful action of divorce, the damages laid at £10,000. Already she had made by her pen £1400 in one year, and after the separation from her husband she continued her literary activity. Her poems include *The Sorrows of Rosalie* (1829), *The Undying One* (the Wandering Jew, 1830), *The Child of the Islands* (1845), and *The Lady of La Garaye* (1862); her novels, *Stuart of Dunleath* (1847), *Lost and Saved* (1863), and *Old Sir Douglas* (1868). In March 1877 she married Sir William Stirling-Maxwell (q.v.), but died on the 15th June following. Her story beyond doubt supplied the subject for *Diana of the Crossways*, the most charming of George Meredith's novels.

Norwalk, (1) a borough and township of Connecticut, at the mouth of a river of the same name, on Long Island Sound, 41 miles by rail NE. of New York. There is a good harbour, and extensive oyster-fisheries. Norwalk possesses the largest straw-hat factory in America, and within the township there are large manufactories of felt-hats and cloth, woollens, shirts, shoes, locks, and door-knobs, besides foundries and ironworks: several of these establishments are in South Norwalk. Pop. (1880) 5308; South Norwalk, 3726; township, 13,956; (1890) 17,739.—(2) Capital of Huron county, Ohio, 55 miles by rail WSW. of Cleveland. It is a pleasant little town, with streets shaded with maples, and manufactures organs, shoes, ploughs, sewing-machines, tobacco, and fanning-mills. Pop. 7268.

Norway (Norweg. *Norge*), the western division of the Scandinavian peninsula, extends from lat. 57° 59′ N. (Lindesnæs) in the south-west to 71° 11′ in the north-east, overlapping Sweden and Lapland on the N. and screening them from the Arctic Ocean. Although 1160 miles in length (coast-line 3000 miles), it varies in width from 20 to 100 miles north of 63° N. lat.; below that line it swells out to a club-shaped mass 260 miles in width. It is separated from Sweden by the Kjölen (i.e. Keel) Mountains (3000 to 6000 feet), the backbone of the peninsula, which run parallel to the Norwegian coast from the plateau of Finmark in the north to 63° in the south, and then bifurcate. The main range proceeds southwards, still marking the boundary between the sister kingdoms, though it decreases greatly in height. The other division continues parallel to the coast, in a south-westerly and then southerly direction, to the extremity of the country. But the mountains in this division no longer form a narrow ridge or 'keel;' they widen out into a broad plateau, undulating between 2000 and 4000 feet and embossed with mountain-knots—Dovre, Jotun, Lang, Fille, Hardanger Fjelde (*fells*)—the separate peaks of which shoot up to 6000 feet and higher (e.g. Galdhöppigen, 8399 feet; Glittertind, 8379; Snehætten, 7566; Lodalskaupen, 6790 feet). The leveller portions of this plateau region consist of dreary moors, covered in winter with snow and in summer with coarse grass and heather, and studded with numerous tarns and belts of forest (conifers, birches, willows). The grass affords pasturage to the sheep and cattle of the dalesmen; the *sætre* or huts of the herd-girls and the wood-cutters are the only habitations in these mountain solitudes. But the bear, lynx, wild reindeer, and lemming make their home there; owls, kestrels, and buzzards prey on the smaller animals and birds; snipe, teal, and loom frequent the lakes; and vast numbers of lapwing and plover breed in the tarns. Moreover, in winter the ptarmigan is plentiful on the snows. Besides these creatures, the fox, eagle, sparrow-hawk, raven, crow, and woodcock are common, not only here, but throughout the kingdom. Numerous wild berries—cloudberries, raspberries, bilberries, cranberries, &c.—ripen on these loftier regions in summer.

Norway presents a bold front to the Atlantic. The west side of the peninsular rampart—the 'Westland,' which is nowhere more than 70 miles wide—sinks down abruptly to the ocean, in some cases by steep terraces, in others sheer to the water's edge. On the inner or eastern side—the 'Eastland'—the slope is more gradual; the general versant faces south-east. The greater part of the country lies between the same degrees of latitude as Greenland, and would in all probability be covered with a similar ice-cap to Greenland—as indeed it was in the end of the Tertiary period—were its shores, on west and north, not washed by the Gulf Stream. It is mainly owing to this warm oceanic artery that Norway is habitable; its influence, together with the direction of the parallel mountain rampart, the distribution of the atmospheric pressure, and the presence of deep-sea banks off the coast, determines the predominant climatological features of the country. The isothermis do not run from west to east, but parallel to the coast. Hammerfest, for instance, on the north coast, in 70° 40′ N. lat., has a winter mean of 22·6° F., ·3° higher than Christiania, which has virtually an inland site, in 59° 55′ N. lat. In winter the west coast districts are the warmest, and the cold increases in intensity according to the distance inland; whereas in summer the reverse is the case, though altitude is then a more potent influencing factor than in winter. The places that have the lowest winter mean (11·8°) are all inland, as Elverum and Röros (Röraas), near the Swedish frontier, Kautokeino (in southern Finmark), and Nyborg (at the head of Varanger Fjord); at all these places the mercury has been known to freeze (−40° F.). The places which have the highest summer temperature are Christiania, the south-west extremity of the country, the heads of the western fjords, and the interior of Finmark. The prevalent south-west winds bring considerable rainfall, 40 to 70 inches in the year, to the west coast of southern Norway. In the interior only 12 to 16 inches fall during the year.

The population has doubled since 1820, when it stood at 977,500, the increase having been most rapid since 1850. In 1885 there were only nine towns with populations exceeding 10,000—viz. Christiania, the capital, 128,302; Bergen, 46,552; Trondhjem, 23,753; Stavanger, 22,634; Drammen, 19,391; Christiansand, 12,749; Fredrikstad, 11,239; Fredrikshald, 11,237; and Larvik, 11,084—all sea-

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port towns. The density of the population over the entire surface is 15·6 per square mile, much the lowest of any country in Europe; but then fully 70 per cent. of the total area is wholly uncultivable, being barren mountain and waste (2 per cent. under glaciers); in addition 24 per cent. is forest. In 1891 the population was 1,999,176; the table shows area and population of district in 1885.

County.	Area, sq. m.	Pop. 1875.	Pop. 1885 (estimated).
Smaalenene	1,599	107,804	117,900
Akershus	2,054	116,365	99,200
Christiania (town)	7	76,054	128,300
Hedemark	10,435	120,618	121,300
Christians	9,976	115,814	105,900
Buskerud	5,736	102,186	102,900
Jarlsberg and Larvik	895	87,506	96,200
Bratsberg	5,863	83,171	87,700
Nedenes	3,608	78,415	82,600
Lister and Mandal	2,804	75,121	77,900
Stavanger	3,580	110,965	117,900
South Bergenhus	6,024	119,303	123,000
Bergen (town)	4	33,330	46,500
North Bergenhus	7,145	86,208	87,500
Romsdal	5,785	117,220	128,300
South Trondhjem	7,188	116,804	122,100
North Trondhjem	8,762	82,271	82,000
Nordland	14,654	104,151	124,300
Tromsö	10,131	54,019	63,700
Finmark	18,295	24,075	29,800
Total	124,495	1,806,900	1,947,000

Finmark, which is inhabited chiefly by Lapps, about 18,000 in number, whom the Norwegians call Finns, whilst the true Finns they call Kvæns, is a monotonous undulating plateau (1000 to 2000 feet). The coast is deeply indented with large fjords (Varanger, Tana, Laxe, Porsanger, Alten), and east of the North Cape (q.v.) is low, bare, and bleak, though the banks of Pasvig, the frontier river with Russian Lapland, are green with patches of firs, pines, and birches. Vegetables, barley, and peas ripen on the shores of the fjords, thanks to the Gulf Stream and the eight weeks of uninterrupted sunlight that prevails in summer. At that season too gnats are a terrible plague to man and beast. The cliffs and islands swarm with wild-fowl, and the sea-waters with fish. The wolf and glutton are common, the former being a dangerous enemy to the Lapps' reindeer herds. West of 22° N. lat. the coast breaks rocky, wild, and precipitous, its outline being irregular in the extreme; and these characteristics it preserves right down to below 59° N. lat., to the point nearest Scotland (280 miles distant). From this point up to the North Cape the entire coast is protected from the Atlantic waves by a belt of rocky islands, called the Skjærgaard or 'Skerry Fence,' between which and the coast there are connected navigable roads, sheltered and safe at nearly all seasons. The outermost islands of this belt are the Lofoten and Vesteraalen chains; in both groups the mountains (2000 to 3000 feet) rise in extremely fantastic pinnacles and turrets, with razor-backed saddles and gabled roofs. But wherever, on these and all the other islands of the Skjærgaard, there are level patches and ledges of soil touched by the modifying climatic influences grass grows abundantly. The climate of the Lofotens is indeed so mild that rye and barley easily ripen, and large flocks of sheep are left out all winter, whilst from 27,000 to 31,000 fishermen congregate here in the winter to prosecute the herring and cod fisheries. All the islands of the Skjærgaard are frequented by enormous quantities of sea-birds, chiefly of the duck and gull varieties; they are 'fowled' for the sake of their down (from the eider duck), feathers, flesh, and oil. On some of the islands the red deer still lingers. On the mainland the mountains in the north have the same bare, angular outlines as in the Lofotens, but support in many parts large forests of fir and pine; in southern Norway they have rounded, dome-shaped summits, and are, next the sea, only sparsely covered with fir (no pine) and other trees. The peninsular rampart is crowned with several gigantic glaciers—e.g. the shores (6000 feet) of Lyngen Fjord in the north are lined with them; from Jökel Fjeld, on an arm of Kvenang Fjord, large masses of ice drop off the glaciers into the sea and float away as icebergs; just north of 67° N. lat. is the enormous snowfield of Sulitjelma (6168 feet), and just south of the same parallel Svartisen (3600 feet), the second largest glacier in Norway, measuring 44 miles by 12 to 25, and sending down glacier curtains to within a few hundred feet of the sea; south Norway possesses the second largest glacier in Europe (Vatnajökull in Iceland being the largest), the roof-shaped Justedal (4600 to 5400 feet), which has an area of 580 sq. m. (87 miles long by 6 to 22 miles wide), and reaches down its icy polypous arms to within 150 feet of the sea; to the south of it lies the snowfield of Folgefond, 40 miles long and 7 to 15 wide (108 sq. m.), and 3000 to 5000 feet in altitude. Throughout Norway the limit of perpetual snow ranges from 3100 feet on Justedal to 5150 on the Dovre Fjeld.

The lofty west coast region is everywhere cleft by gigantic fissures, very narrow and winding, into which the sea-water flows—the fjords. In some cases they are of great depth, much deeper than the sea outside (200 fathoms): Sogne Fjord, for instance, is 2820 feet deeper; Hardanger Fjord, 930 feet; and Vest and Nord Fjords, 840 feet. Some of them penetrate great distances inland and send off numerous branching arms. Sogne Fjord cuts its way to the foot of the Jotun Fjeld, 106 miles from the ocean, and Hardanger Fjord, which encircles the Folgefond, is 68 miles long. Nord and Sogne Fjords clasp the Justedal between them. These three fjords offer some of the grandest and most accessible scenery in Norway. Their landward continuations either rise rapidly to the plateau region above or form narrow valleys at a slightly higher elevation, and in that case generally contain a deep lake separated from the fjord by a moraine or barrier of glacial deposits. The finest of these valleys is Romsdal, where the rounded, pure gneiss mountains tower up to 6000 feet with almost perpendicular walls. The steep sides and extremities (2000 to 4000 feet) of these fjords and valleys are braided with waterfalls, varying in character from trickling ribbons and veils of white foam to full-volumed streams like Skjæggedal (530 feet), Vöring (475 feet), and Vetti (900 feet). The inner reaches of the fjords have as a rule warm summers and mild winters; all the ordinary cereals and hardy fruits ripen easily, and such trees as fir, birch, hazel, elm, mountain ash, aspen, bird-cherry, oak, ash, lime, and alder grow according to the elevation. The only considerable break in the lofty coast-wall is the basin of Trondhjem, a little north of 63° N. lat. This district was the centre of the ancient national life of the country, and in the cathedral of Trondhjem city (called Nidaros to the middle of the 16th century) the kings of Norway are still crowned. The southern coast-lands, bordering the Skagerrack and the wide Christiania Fjord, are comparatively low and tame.

On the eastern side of the peninsular rampart the valleys trend south and south-east, and converge upon Christiania Fjord. At their upper extremities they are generally narrow and deep; and many are filled with chains of lakes, which make fine waterfalls (Rjukan, 800 feet, in Thelemarken) as they drop from level to level; their lower reaches get wider and shallower as they proceed south. Most of these valleys are traversed by mountain torrents and streams, the longest being the Glommen (350 miles), Drammen (163), with

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its tributary the Hallingdal (113), Numnedal Laagen (143), and Otteren (140). Some of these streams in their lower courses expand into long narrow lakes of considerable size: Lake Mjösen is 60 miles long, and its bottom is 1080 feet below the level of the sea; others are Randsfjord (43 miles long), Tyrifjord (19 miles), and Fæmund (35 miles long and 2300 feet above sea-level). The slopes of these valleys, especially in the southern and eastern parts of the country, are planted for miles upon miles with forests, chiefly fir. In these forest regions the elk is still found, and the blackcock, capercailzie, and hazel-grouse abound. The trees are felled principally in winter, and floated down the streams in early spring to the sawmills at their mouths.

Geology.—The great mass of the Norwegian plateau consists almost entirely of Archæan rocks, chiefly granite and gneiss, with quartz and hornblende schists in a subordinate degree, in very many cases clearly stratified. In central and western Norway (the fjeld region) the primary rocks are covered with layers of metamorphosed clay-slate and quartzite, whilst large masses of eruptive rocks of later date, such as granite, syenite, gabbro (especially in the Jotun Fjeld), porphyry, greenstone, labradorite, serpentine, have pierced through both formations and overspread them in broad sheets or coverlets. The prevailing formation in eastern Norway is called Sparagmite, a loose accretion of conglomerates and breccias, sandstone and quartz. Bands of Silurian rocks extend across the southern part of the country from south-west to north-east, the two most clearly-defined belts stretching from Hardanger Fjord to Trondhjem and from Skien Fjord (on the south coast) to Lake Mjösen. Most of the rocks of the plateau have been greatly crumpled, folded, twisted, crushed, and dislocated. The prevailing formation throughout northern Norway is granite. Nearly all parts of the country bear conspicuous traces of the scratching, grinding, and polishing to which the structural rocks were subjected during the Glacial age and the period of its departure. Incised and striated lines, and polished surfaces, occur at all altitudes up to 5000 feet, and generally follow directions radiating outwards from the highest mountain-knots of the peninsular rampart. Boulders litter the surface of the country nearly everywhere; moraines are numerous, and transverse ridges of glacial detritus block the mouths of many of the valleys; 'giant kettles,' the basins that received the glacial cataracts, occur in numerous districts near the sea. Moreover, the lines of ancient beaches, whether of the ocean or of glacial lakes, are distinctly traceable at many points along the coast from Bergen to the North Cape; sometimes there are two, or even more, one above another. The coast of northern Norway is estimated by some authorities to have risen between 400 and 600 feet. See UPHEAVAL.

Industries and Occupations.—Norway's natural wealth lies in her fisheries, her forests, and her shipping; her manufactures, her mines, and her agriculture are all unable to meet the home demands.

By far the most important of the fisheries are the cod and herring. Cod are taken by 80,000 to 90,000 men on the west coast from January to April. They are cured chiefly in two ways, being either dried on wooden frames (hence called *törfisk* = 'dry fish') or slightly salted, carried to the mainland, split open, and dried on the rocks (hence *klipfisk* = 'split fish'). The former are exported to Italy to the average annual value of £374,000, the latter to Spain to a value ranging from £599,000 to £981,000 a year. Besides, cod-liver oil is exported to an annual average of £338,000, salted roe to £289,000, and heads and offals, powdered for manure, to £37,000 to £63,000. Herrings are taken all the year round and exported to an annual value varying from £575,000 to £639,000. Mackerel (£83,300) and oysters are taken off the south coast, and salmon and sea-trout (£43,400) and lobsters (£26,200) off the west coast. Off the north coast of Finmark cod, saithe, flounders, smelt, &c. are taken in summer and bartered to Russian merchants for flour; this fishery engages about 13,000 men. The fishery in the Polar seas for whales, walrus, seals, dog-fish, sharks, &c. is prosecuted by about 1000 men in less than 100 small vessels, sailing from Tromsö and Hammerfest, with a few from Vardö; their total earnings in a season vary between £175,000 and £378,000. The inland lakes and rivers contain an abundance of salmon, trout, and red charr, and some of the southern lakes have also grayling, bream, perch, and pike.

The forests cover about 24 per cent. of the entire surface, though the area has been of late years very greatly diminished. Trees are, however, being systematically planted in several parts. The sawmills (340 in number) give employment to 10,300 men, whilst 1600 more are engaged in the preparation of wood-pulp and cellulose (42 factories in 1885). Timber of all kinds is exported to a total value of £1,785,000 (1888; £2,111,000 in 1890), wood-pulp and cellulose to £509,500 (a steady increase from £130,300 in 1880), matches to £97,400, and articles manufactured from wood to £23,600.

Agriculture is carried on chiefly in the vicinity of Christiania, the lower ends of the eastland valleys, in the level district of Jæderen in the extreme south-west, and around Trondhjem. The farms are mostly small; 94 per cent. of the entire number measure less than 50 acres each, and more than half the farmers own the land they cultivate. Of the total population 53 per cent. are engaged in or connected with agriculture. The rearing of cattle, sheep, and goats—in the north reindeer—are important branches. The area under cultivation is only 2 per cent. of the entire surface of the country, and meadows and grazing land add another 2·8 per cent.

A century ago and down to about 1870 the copper and iron mines of Röros and the silver-mines of Kongsberg yielded considerable outputs; but they have since greatly declined. The only vigorous mine is at Vigsnæs (on Karmö, at the entrance to Bukken Fjord), which yields £61,000 worth of pyrites in the year. The total mineral output of Norway (iron pyrites, silver, copper, apatite, nickel) was worth £181,300 in 1885, one-half the value of 1882. The silver mined is, however, still worth £57,700 a year. Barely 2000 men are employed in this occupation.

The purely industrial establishments are grouped mainly around Christiania, and do not employ more than 45,500 persons altogether. Besides some already mentioned, the more important are textile manufactures (6037 employees and 143 factories), machine-shops (4282 men in 50 establishments), chemical factories (75 with 3002 men), iron and metal works (67 with 2881 men), brick-works (105 with 2354 men), flour-mills (387 with 1787 men), tobacco-factories (43; 1677), breweries (47; 1411), and in a minor degree tanneries, distilleries, and factories for matches, glass, oil (fish and vegetable), and paper. Water is the favourite motive power, only 502 out of 1925 establishments using steam in 1885.

The Norwegians rank amongst the busiest sea-carriers of the world, close upon nine million tons of merchandise having been carried in Norwegian vessels, in all parts of the world, in 1888, the owners of which earned the aggregate sum of

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£5,168,000. Yet the mercantile marine of Norway only embraced in the same year a total of 6697 sailing-vessels of 1,396,998 tons and 536 steam-vessels of 137,542 tons. But, as in nearly all other countries, steam-vessels are supplanting sailing-vessels. Shipbuilding is carried on (1888) in seventy-nine establishments, employing 1846 men, and situated chiefly in the south. Sails are made by 906 men in fifty-eight workshops. The coast fishermen use for the most part heavily-built wooden vessels, of small tonnage, with high, square sterns.

The ports of Norway were entered in 1888 (an average year) by 11,258 vessels, having an aggregate tonnage of 2,303,225, of which 63 per cent. entered under the Norwegian flag and 16 per cent. under the British. The exports during the ten years ending 1888 ranged between £4,957,000 (1879) and £6,831,000 (1882) in value, the imports between £7,346,000 (1879) and £9,167,000 (1881). The figures were lowest in 1885 and 1886, but since then have been rising; by 1888 they had got back to the level of 1882. The United Kingdom sends 28 per cent. of the imports and receives 32½ per cent. of the exports. Germany comes next with 27 per cent. of the imports and 14 per cent. of the exports, and Sweden third, with 13 and 13½ per cent. respectively. The principal articles of import are rye, barley, and wheat and rye flour (altogether £1,595,000 in 1888), textiles (£1,527,600), bacon, butter, and other provisions (£780,000), iron and other metals, raw and manufactured (£766,300), coffee (£564,600), coals (£473,300), ships (£389,800), sugar and molasses (£293,000), timber from Sweden, in transit (£249,900), oils and glycerine (£236,400), hides (£224,900), wines and spirits (£173,100), and smaller quantities of salt, tobacco, fruits and vegetables, paper, &c. The more important of the exports are fish (£2,559,400 in all in 1888), timber, &c. (£2,415,600), minerals and metal-wares (£414,100), oils, tallow, tar, &c. (£342,900), hides, horns, &c. (£312,400), textiles (£197,400), and paper and dyestuffs. In addition meat, groceries, and timber to the total value of £318,100 pass out of the country in transit. Close upon 64 per cent. of the total foreign trade passes through the three principal ports—Christiania (38½ per cent.), Bergen (17½ per cent.), and Trondhjem (7½ per cent.).

People.—The Norwegians share with the Swiss the honour of being the most democratic people in Europe. They are proud of their freedom and independence, are simple, honest, and straightforward, sober and frugal, and in general unaffectedly pious, though in some districts liable to violent outbursts of passion. Otherwise they are slow of action and take life leisurely. The rural population, embracing five-sixths of the total, are decidedly more democratic than the urban. All titles of nobility were abolished in 1821, and none but townsfolk use the equivalent of our 'Mr.' Owing to the insufficiency of the natural resources of the country to support the people, nearly 20,000 emigrate every year; between 1880 and 1888 inclusive 183,267 persons in all left their country for good, almost all going to settle in the United States. Those who remain behind are fairly prosperous on the whole, for, though £380,000 to £390,000 are distributed every year in poor-relief to between 65,000 and 67,000 persons, there are (1889) 345 savings-banks, holding deposits to the total amount of £10,364,200 in the name and behalf of 452,736 depositors (23 per cent. of the total population), giving an average of £22, 17s. 10d. for each depositor. In the matter of illegitimacy the record is not so good: in the ten years ending 1885 of the total number of children born 8·25 per cent. were illegitimate; the figure stands in England at 4·8; in Scotland, 8·3; in Ireland, 2·9. Since 1871 earnest endeavours have been made to diminish the consumption of spirituous liquors, the instrument chiefly relied upon being the Gothenburg licensing system. This system was by 1888 established in all but three out of the fifty-four towns of the kingdom. By this means, in spite of the rapid growth of the population, the consumption of spirituous liquors decreased from 2,698,960 gallons in 1876 to 1,325,060 gallons in 1888, a reduction of more than one-half. Moreover, after paying expenses, granting 5 per cent. to the shareholders, and compensating the sellers of spirits whom the system supplants, there remains an annual surplus of £42,800 to £55,500, which is spent in the maintenance of schools, public roads and parks, water-works, poor-relief, and charitable institutions. As road-makers the Norwegians vie with the Swiss; their difficult country has compelled them to perform some feats of engineering skill of no mean order. But the principal means of communication are steamboats, which ply all along the coast, on the fjords, and the inland lakes. There are, however, some 15,000 miles of well-kept national and communal roads, and 970 miles of railway (all but 42 miles managed by the state), and close upon 5000 miles of telegraph lines (not wires). The railway lines radiate chiefly from Christiania. One connects Trondhjem with the capital, and in 1891 there were three built and one building to connect Norway with Sweden. Norway is now visited every summer by great numbers of tourists; the number increased from 13,569 in 1886 to 23,403 in 1890, one-third being British, the rest chiefly Swedes, Danes, and Germans.

The people are on the whole well educated and intelligent. Attendance at school is free, and compulsory upon all children between seven (six and a half in towns) and fourteen. The country is well equipped with primary schools, and for the higher branches there are fifty-four middle-class schools, seventeen lyceums, and the university of Christiania, with five faculties, and (in 1888) 1650 students and fifty-four lecturers. In addition there are numerous excellent private schools. The state contributes about one-third of the total cost of the public educational establishments throughout the country. Except for about 4000 persons, the entire population belong to the Lutheran Church. For purposes of ecclesiastical government the country is divided into six dioceses (*stifts*), each administered by a bishop—viz. Christiania, Hamar, Christiansand, Bergen, Trondhjem, and Tromsö.

Constitution.—Norway is a free, independent state, nominally a kingdom, but practically to all intents and purposes a republic. The supreme executive rests with the king, who is at the same time king of Sweden; but the responsibility for his acts is borne by a council of state, appointed by himself from Norwegians above thirty years of age, and consisting of two ministers and at least seven councillors. One minister and two councillors must always be in attendance on the king when he is not in Norway. The other minister and the remaining councillors administer the internal affairs of the country, the minister presiding over the deliberations of the council (sometimes also taking a portfolio), and the councillors directing each a special department—at present seven, Religion and Education, Justice, Interior, Public Works, Finance, Defence, Revision of all Public Accounts. As viceroy in Norway the king may appoint his eldest son, or *his* eldest son, but none other; if there is a viceroy, he presides over the council of state. The king declares war and peace, and makes treaties and agreements on his own initiative, but cannot use the army and fleet for an aggressive war without the consent of the Norwegian parliament. Both countries are represented by one and the same

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diplomatic corps. The people participate in the government through the Storthing or parliament, which consists of 114 members, 76 representing the country districts and 38 the towns. All Norwegians above twenty-five years of age who satisfy certain conditions of residence and property qualification, or station, meet once in every three years in the parish church and choose one man from every hundred of their number to select the members of parliament for the county. Every man so selected, even though it be against his will, is obliged to sit in one parliament (of three years), but not in a second. If a sitting member dies his place is taken by the man who stands next on the list of representatives selected by the electors. As soon as the Storthing meets (in February every year in Christiania) one-fourth (29) of the assembled members are chosen to form an upper house (*Lagthing*); the remainder constitute the lower house (*Odalsthing*), in which all legislative measures are proposed either by a member of the house or by a member of the government. The upper house may send back a bill twice; but after the second rejection both houses vote together as one, though in that case a majority of two-thirds is necessary. The king's signature makes a bill law. But if he refuses to sign, and the bill is passed by three successive parliaments (not sessions), it becomes law in spite of the king's veto. Every member of the parliament is allowed 13s. 4d. a day with travelling expenses. The affairs of each county are directed by a special administrative officer. Both the counties and the communes enjoy a liberal degree of self-government. Justice is administered locally by sheriffs; from them an appeal is allowed to one of the four so-called diocesan courts, and from them to the supreme court sitting at Christiania. The national expenditure averages slightly under two and a half millions per annum, and the revenue somewhat less. The national debt amounted in 1888 to £5,849,070. There are two national banks, a joint-stock bank with a capital of £2,973,300, and a hypothec bank with a capital of £611,100. The monetary unit is the *krone* (= 1s. 1⅛d.), divided into 100 *öre*. The metric system of weights and measures prevails; and Norway has her own national flag distinct from Sweden. The national defences embrace an army and navy. All men, not incapacitated or specially exempt, above the age of twenty-three serve ten years with the colours, but are only called out for a few weeks' exercise every summer. Close upon 6300 men are drawn by conscription annually. The inhabitants of the counties of Nordland, Tromsö, and Finmark, with a certain proportion of the coast population farther south, are liable to conscription for the navy, and serve from twenty-two to thirty-five years of age. The naval dockyards are at Horten, on the west side of Christiania Fjord. The fleet consists of about a dozen gunboats (first and second class), four ironclad monitors, and some thirty other vessels, with a torpedo service.

See Kiser, *Norges Land og Folk* (1886); Kirchhoff, *Länderkunde* (pt. ii. 1890); in English, see Du Chaillu, *Land of the Midnight Sun* (2 vols. 1881); F. Vincent, *Norsk, Lapp, and Finn* (1881); Mary Godwin, *Letters from Norway* (1796); J. D. Forbes, *Norway and its Glaciers* (1853); and numerous modern books of travel, such as C. W. Wood, *Round about Norway* (1880); Lovett, *Norwegian Pictures* (1885); Corning, *From Aalesund to Tetuan* (1889), and others. For the geology, see Kjerulf, various works in Norwegian (1855–79); for the plant-life, Schübeler, *Norges Væxtrige* (3 vols. 1885–89), and other works; and for the statistics, the publications of the Norwegian statistical department, partly duplicated in French. The best guidebooks to the country are those by Yngvar Nielsen, Baedeker, Tönsberg, Bennett, Jörgensen, and Wilson.

History.—It is not until the 9th century that the story of Norway begins to emerge from the obscurities of myth and legend. At the time the tribes of Gothic descent crossed the Baltic and settled in the southern parts of the Scandinavian peninsula they found the Lapps or Finns in possession. These people they drove north towards the Arctic Ocean. When this immigration took place cannot be determined exactly. Indeed, if, according to one theory, the original home of the Aryans was in Scandinavia, it probably never took place at all. At the dawn of the historical period Norway was parcelled out among the free men of the race (Norrœni, Norsemen, Norwegians), whose slaves—prisoners taken in war—tilled the soil, whilst they and their free dependents spent their time in fighting, viking raids, and similar pursuits. The ties that united these free men were personal rather than political or territorial, though for judicial purposes all who dwelt in a well-defined district (*fylki*) met at stated intervals and at fixed places to adjudicate in common, on terms of strict equality. Several of these districts were associated together in a higher unity—the *thing*. Of such *things* or meetings there came to be eventually three, the Frosta for the north, the Gula for the west and south, and the Eidsifia for the east; at a later date the Borgar *thing* for the south-east was separated from the Eidsifia. Each of these *things* had its own independent code of purely customary laws. The chief men, calling themselves kings, later jarls (earls), had no official authority; their power was due solely to their personal influence—their character, wealth, warlike renown, and long descent (compare NORTHMEN).

The cradle of the future kingdom of Norway was the district of Vestfold, on the western side of Vik (now Christiania Fjord). There a royal race from Sweden established themselves, seemingly in the 7th century. A descendant of these kings, Black Halfdan (died 860), reduced the petty kings to the north of him, as far as Lake Mjösen. His greater son, Harold Haarfager or Fairhair (king 863–930), extended his sway as far north as Trondhjem, in which district, as being his first conquest in lands that owed no allegiance to the chief king in Sweden, he established the seat of his power, just as the elector of Brandenburg called himself Frederick I. king of Prussia. After that in three great sea-fights, the last near Stavanger in 883, he conquered the kings of the west and south-west, and proclaimed himself chief king in Norway. But many of the defeated chiefs (kings) refused to submit to Harold, especially when he asserted the right of conquest, seized their odal lands, and introduced a form of feudalism. They sailed across the Western (North) Sea, and colonised the Faroe, Shetland, and Orkney Islands, the Hebrides, Man, Ireland. But they so harassed the men (jarls) to whom Harold had given their lands in Norway that the king, pursuing them, slew many of them and reduced the islands to his sway, and appointed earls over them (Orkneys, Hebrides). Those who were still disaffected escaped his rule by sailing on farther to Iceland. In Harold's reign the skalds or improvisatore court-poets began to compose, and were held in great honour. Harold's son, Erik Bloodaxe, was driven from Norway by a younger brother Haco in 935, and for many years the country was distracted by Erik's sons trying to recover their father's power. After Haco died (961) their principal opponent was Earl Haco of Trondhjem, who ruled Norway west of the mountain plateau until he was killed in a revolt (995). Olaf Tryggveson, a descendant of Harold Haarfager, a man who had won great fame as a viking in England (991–994) and elsewhere, stepped into the gap. Like his great-uncle Haco, he was a Christian,

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and like him he attempted to make his people Christian, and he did make them Christian, at least nominally and superficially. The beau-ideal of a sea-king, and the pride and admiration of his people, Olaf died a hero's death, fighting against a host off the north coast of Prussia (1000). After an interval of fifteen years another Olaf, likewise a descendant of Harold Haarfager, landed and won the kingdom from the sons of Earl Haco. This Olaf, St Olaf, made his people's Christianity more real, first thoroughly welded the kingdom into a united state, made all the western islands tributary, and ruled sternly but well. Ever since the days of Harold Haarfager the king of the Danes had claimed supremacy over at least southern Norway; in 1028 the great Canute came with a large fleet to make good his claim. Olaf fled to Russia, and in attempting to win back his crown perished in battle at Stikklestad near Trondhjem (1030). Five years later the chiefs of the land made Olaf's son Magnus king, and he became king of the Danes also in 1042. But this office he found so difficult that in 1046 he associated with himself as king his uncle Harold Haardraada, who had served in the Væring guard at Constantinople and had fought against the Saracens in Sicily. War between the Danes and Norsemen was almost chronic all through the reigns of Magnus and Harold, who became sole king in 1047. Harold's love of adventure led him to his death at Stamford Bridge in England in 1066. During the peaceful reign of Harold's son, Olaf Kyrre (1067–93), commerce thrived, industrial guilds were formed, and the land prospered greatly. The next king, Olaf's son, Magnus Barefoot, waged war in the Orkneys, Hebrides, and Ireland, till he fell in this last island in 1103. Two sons of Magnus, Eystein (died 1122) and Sigurd (died 1130), then reigned in concert, Eystein being a quiet stay-at-home prince, whilst Sigurd, who had inherited all the adventurous enterprise of his ancestors, sailed to the Levant, and visited Jerusalem and Constantinople (1107–11). After his return he greatly fostered the church. At this period the towns began to be prosperous.

From 1130 to 1240 the country was torn by internal feuds, three predominant parties contesting for power—an oligarchical party amongst the chief men; the bishops' party, who claimed the right to elect the king; and after 1174 the nationalist Birkebeiner (i.e. 'Birch-legs'), who generally had the first two parties allied against them, but who in the long-run got the victory. After defeating the earls and bishops, and slaying their nominee or puppet, King Magnus, in Nord Fjord (1184), they made their leader Sverre (died 1202), a Faroe islander, and a clever man, king. Nevertheless, the civil strife went on until the twenty-third year (1240) of the reign of Sverre's grandson Haco. This king reigned twenty-three years longer, and during that time the land recovered from her distractions. Iceland acknowledged the supremacy of the king in Norway in 1262. Haco died at Kirkwall (1263), shortly after being defeated at Largs in an attack upon Scotland. It was during the first half of the 13th century that the Old Norse literature began to be written down. The laws were put in writing during the reign of Haco's son, Magnus the Law-betterer (1263–80), who, in 1266, gave up the Hebrides to Scotland. The pretensions of the bishops' party were finally crushed by Erik (died 1299), son of Magnus, and father of the little Margaret, Maid of Norway. Erik's successor, his brother Haco, dying (1319) without a son, the throne passed through a daughter to the Swedish royal house, and again through marriage to the Danish (1380). The great Queen Margaret of Denmark united all three kingdoms by the Union of Kalmar (1397).

And now evil days fell upon the land. The extraordinary exertions of Norway's youth seem to have worn her out early; her high spirit and enterprise were gone; her literature died out, and her intelligence burned down to a dull glimmer; her commerce passed into the tyrannical hands of the Hanseatic merchants of Bergen; her old colonies, Orkney and Shetland, were pledged to Scotland for ever in 1468; Denmark, which at first respected her national rights, treated her from 1536 as a conquered province, and forced the Reformation upon her, yet the Norwegians never seriously resented the harsh and oppressive treatment of their rulers. In 1612 some 300 men from Scotland, whilst making their way to join the army of Gustavus Adolphus in Sweden, were cut to pieces by the Norwegian peasantry in the pass of Kringelen in Gudbrandsdal.

The national spirit began to stir again in the awakening of the peoples occasioned by the French Revolution; and the transference of Norway to Sweden in 1814 gave back to the Norwegians their national rights, a liberal constitution, and their sense of national unity. At first they resisted the transference. Prince Christian of Denmark headed the movement for independence, and summoned a national assembly, which at Eidsvold (17th May) drew up a liberal constitution. But Sweden marched her forces into the country, and on 10th October Christian abdicated. Charles XIII. of Sweden, having recognised the constitution, was elected king on 4th November. In 1821 the Norwegians abolished all titles of nobility. The spirit of independence and of nationality has grown stronger as the years have passed, industry has thrived, commerce has prospered and brought wealth, and, intellectually, Norway stands in the van of progress. The principal event since the union with Sweden was the overwhelming protest of the people against the right claimed by the king to veto absolutely bills duly passed by their elected representatives, the struggle lasting through the years 1872–84.

See Munch, *Det Norske Folks Historie* (7 vols. 1852–63); E. Sars, *Udsigt over Norges Historie* (1873–77); Keyser, *Norges Stats- og Retsforfatning* (1867). In English, *Heimskringla*, trans. by W. Morris and Magnusson (vols. iii.–vi. of Saga Library, 1891) or by Laing (3 vols. 1844; new ed. 1890); Boyesen, *History of Norway* (new ed. 1890); T. Michell, *History of the Scottish Expedition to Norway in 1612* (1886); and Powell and Vigfusson, *Corpus Poeticum Boreale* (1883). Carlyle's *Early Kings of Norway* (1878) is adapted from Laing's *Heimskringla*.

Literature.—Like Germany, Norway has an ancient and a modern period of literary history—the interval between being mostly blank. The ancient period of Norwegian literature is that of the Sagas (q.v.), and see also ICELAND, SNORRO, EDDA. What writers Norway gave birth to between the 13th and the 19th century, except Peder Dass (1647–1708) and Dorothea Engelbretsdatter (1634–1716), are counted amongst the Danes, in whose language they wrote. These men, Holberg, Tullin, Wessel, Fasting, Brun, Frimann, and others—some of them the brightest ornaments of Danish literature—have been already mentioned under Denmark (q.v.).

The modern period begins with the re-awakening of the national life; it received its first impulses from the Norwegian Society, a band of patriotic men living in Copenhagen in 1772, from the founding of a native university at Christiania in 1811, and from the recovery of national independence in 1814. The earliest writers of the new era, the poets Bjerregaard (1792–1842), M. C. Hansen (1794–1842), and Schwach (1793–1860), though the ring of patriotism is in their work, possessed little originality. The creator of the modern national literature was Wergeland (1808–45), the Schiller

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of his country, who believed that in the free peasant proprietor lay the hope of Norway's future, and who laboured earnestly to make him worthy of that high calling. The nebulous thought and disregard of æsthetic law and taste shown in his earlier works provoked the satirical attacks of Welhaven (1807–73), a master of poetic form, and the representative of the intellectual aristocracy of the country, the mercantile and official classes. This gave rise to a keen literary feud. But, apart from Andreas Munch (1811–84), the ladies' poet, who stands by himself, and the poets J. Moe (1813–82), Jensen (1812–67), and Th. Kjerulf (1825–88), who were more or less influenced by Welhaven, nearly all subsequent writers have worked in the spirit of Wergeland, and for the same ends. Monsen (1815–52) penned lyrics which sometimes approach the best of Wergeland's later work in quality. Aasen (born 1813), Vinje (1818–70), K. Janson (1841), Sivle (1857), and Garborg (1851), the *Maalstrævər*, have tried to create a literary language by collating and fusing together the various peasant dialects, the first named more especially in philological works, the others in tales and novels, and even in poetry. Garborg is a writer of striking individuality. Asbjörnsen (1812–85) and Moe, the poet, and Faye collected the folk-tales; Landstad (1802–81), the hymn-writer, and Bugge (1833) collected the popular songs. Daa (1809–77) popularised the history of his country, and Vig (1824–57) laboured in the same direction in various works for the people. Schultze (1823–73), Friis (1821), Östgaard (1812–73), Magdalena Thoresen (1819), and others have described well and lovingly their native land and its people. Björnson (1832), M. Thoresen, and Lie (1833) have written good tales from the life of the provinces; the peasant tales of Björnson are of great merit. Eilert Sundt (1817–75) strove to educate the country-people through his treatises on their social and economic circumstances. The chief writers of the latest phase of Norwegian literature are Ibsen (1828), Björnson, Lie, Kjelland (1849), Garborg, Camilla Collett (1813), Elster (1841–81), M. Thoresen, Jæger (1854), Flood (1837), Gloersen (1838), Amalie Skram (1847), Kristofersen (1851), Krogh, Gunnar Heiberg, Hamsun, and others. Speaking generally, these authors, all novelists except Ibsen and Heiberg, show a strenuous desire for truth, great earnestness, a strongly realistic way of looking at things, keen delight in intellectual and moral strife, remarkable directness, vigour, and freshness of style, a decided leaning to satire, and frequently, too, a charming naïveté and striking originality. Ibsen, a writer of conspicuous power and genius, has written nothing but plays, historical, lyrical, and socio-satirical; Björnson, Kjelland, Lie, and M. Thoresen have also produced dramatic works, all, except the lady's, of considerable merit. The poems of Ibsen and Björnson likewise take high rank; Gloersen and Lie write respectable verse. Kjelland satirises the classes of whom Welhaven was the representative; he has strong cosmopolitan, especially French, tendencies. Poulsen (1850), 'Marie,' and Marie Colban (1814–84) must be mentioned as voluminous and popular authors of works of a light character.

In other departments than pure literature the subjoined must be named: in literary history, Botten-Hansen (1824–69), H. Lassen (1824), Jæger, Skavlan (1838), Dietrichson (1834); in history, P. A Munch (1810–63), Keyser (1803–64), Lange (1810–61), Daae (1834), E. Sars (1835), G. Storm (1845), B. Moe (1814–50), Faye (1802–69), Nielsen (1843); in philosophy, Treschow (1751–1833), Monrad (1816), a Hegelian; in theology, Caspari (1814), Hauge (1771–1824), Wexels (1797–1866), F. W. Bugge (1838); in philology, P. A. Munch, Keyser, Bugge, Aasen, Unger (1817), Fritzner (1812), Stockfleth (1787–1866); and, as orientalists, Caspari and C. Lassen (1800–76); in archæology, Rygh (1833); in jurisprudence, Schweigaard (1808–70), Lasson (1798–1873), Aschehoug (1822), Stang (1808), Hallager (1816–76); in mathematics, Hansteen (1784–1873) and Abel (1802–29); in science, Michael Sars (1805–69) and his son, G. O. Sars (1837), as biologists, and Keilhau (1797–1858) and Th. Kjerulf (1825–88) as geologists. The best Norwegian painters have been Tidemand (1814–76), C. F. S. Hansen (1841), Gude (1825), M. Müller (1828), S. Jacobsen (1833), Munthe (1841), and Sinding (1842); the best sculptor, Middelthun (1820–86); the best musicians, Ole Bull (1810–80), H. Kjerulf (1815–68), Grieg (1843), and Svendsen (1840).

See Schweitzer, *Geschichte der Skandinavischen Litteratur* (3 vols. 1886–90); Gosse, *Northern Studies* (2d ed. 1882); Halvorsen, *Norsk Forfatter-Lexikon, 1814–80* (1881 *et seq.*); Jæger, *Norske Forfattere* (1883); and Botten-Hansen's excellent bibliography, *La Norvège Littéraire, 1824–66* (1869).

Norway Haddock. See BERGYLT.

Norwich, a cathedral city of England, the capital of Norfolk, and a parliamentary, county, and municipal borough (the first returning two members), is situated on the Wensum, immediately above its confluence with the Yare, 18 miles W. of Yarmouth and 114 NNE. of London. Pop. (1801) 34,975; (1831) 61,110; (1881) 87,842; (1891) 100,964. Built on the summit and slopes of a hill which gradually rises from the river, the city, with its hamlets, covers an area of 7472 acres, as compared with that of two miles enclosed by its ancient walls (1294–1342), and its narrow, winding streets are rich in examples of early architecture—as Pull's Ferry and the Bishop's Bridge (1295), both on the river-banks; St Giles' Hospital (founded 1249); the Ethelbert Gateway (*circa* 1272); Bishop Salmon's Gateway (*circa* 1325); the Guildhall (completed 1413); Erpingham Gate (1420); the Music House (partly Norman, and once a residence of Sir Edward Coke); the Bridewell (Decorated and Perpendicular, *circa* 1400); and the Dolphin Inn (1587). The cathedral, almost wholly Norman in style, but the growth of more than four centuries, occupies a site close to the river, and was founded in 1096 by Bishop Herbert Losinga: its dimensions are 407 feet in length by 72 in breadth (or 178 across the transepts), and it is surmounted by a noble (Norman) tower and (Decorated) spire of 315 feet—the highest in England next to Salisbury: special features are the relics, consisting of two glorious arches, of its Early English Lady Chapel (demolished 1573–89); its cloisters, 175 feet square (1297–1430); the Decorated Beauchamp Chapel (in which is preserved the Bible used at the coronation of Queen Victoria), and the vaulted roof of the nave and transept, rich in mediæval sculptured bosses. Close by is the grammar-school, founded (as a Mortuary Chapel) in 1319, and famous as the place of education of Lord Nelson, Rajah Brooke, and other celebrities; also St Andrew's Hall (Perpendicular; formerly the church of the Black Friars), in which are held the triennial musical festivals, first established at Norwich in 1824. Next after the cathedral the most striking edifice is the castle, crowning the summit of a sugar-loaf mound in the centre of the city, and originally, with its defences, extending to the picturesque market-place: its massive quadrangular Norman keep, the only portion now standing, was used as a prison till 1886. In it and the adjacent prison-buildings has been placed the local museum, famous for its collection of raptorial birds. On the cattle-market beneath the castle is held annually, on Maundy Thursday, the famous cattle and sheep

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fair, formerly held on Tombland, and so graphically described in Borrow's *Lavengro*. The churches, forty-four in number, are for the most part built of flint, and in the Perpendicular style: those of St Peter Mancroft (where once Archbishop Tenison ministered), St Andrew, St Giles, St Lawrence, St Michael Coslany, and St Stephen are the finest examples; whilst of public buildings of modern date mention should be made of the hospital (founded 1771 and rebuilt 1879–83), an Agricultural Hall (1882), and a Volunteer Drill-hall (1886). Formerly one of the largest seats in England of the worsted-weaving trade, the city is still noted for its textile fabrics—especially its crapes; but the principal manufactures now carried on are those of mustard, starch, ornamental ironware, boots and shoes, whilst extensive breweries and a vinegar distillery, as well as large nursery-gardens on the outskirts of the town, give employment to many hands.

Oft-times pillaged by the Danes, and in 878 Guthrum's headquarters, Norwich in 1004 was burned by Sweyn, and thirteen years later was held by his son Canute. Subsequent to the Norman Conquest the principal incidents in its history have been the translation of the bishopric hither from Thetford (1094); the granting of its first charter of self-government (1194); its sacking by Louis the French Dauphin (1216); the riotous attack by the citizens on the cathedral monastery (1272); its first representation in parliament (1295); settlements of Flemish weavers (1336) and of Dutch and Walloon refugees (1558–1603); a hurricane (15th January 1362), which blew down the spire of the cathedral; John Litester's rebellion (1381); disastrous fires (1463 and 1509), on the last occasion the roof of the cathedral being destroyed; the encampment of Ket's rebels on Mousehold Heath (1549); many royal visits, and outbreaks of the plague, the worst being the Black Death in 1349, when half the population is supposed to have perished, in 1602, when 3076 persons died, and in 1665, when 2251 succumbed; and a collision on the railway 2 miles to the east of the city (10th September 1874), when twenty-five persons lost their lives. Among the sixty-five bishops of Norwich have been Pandulph (the pope's legate), Salmon (the builder of the grammar-school), Bateman (the founder of Trinity Hall at Cambridge), Despenser ('the fighting Bishop of Norwich'), Corbet (the poet), Hursnett and Manners-Sutton (afterwards Archbishops of York and Canterbury), Wren (father of the celebrated architect), Joseph Hall, and Reynolds (the composer of the General Thanksgiving in the Prayer-book). Of citizens the best known are Sir Thomas Erpingham (builder of the gate which bears his name, and chamberlain to Henry IV.); Thomas Bilney; Archbishop Parker; Dr Caius; Greene (the poet and dramatist); Bishops Cosin and Tanner; Sir Thomas Browne; Dr Samuel Clarke; Sir James Edward Smith; 'Old' Crome, his son, Cotman, Stark, and Vincent (the 'Norwich school' of painters); Mrs Opie; Crotch (the musical composer); Wilkins (the architect and R.A.); Professors Taylor and Brewer; Sir W. J. Hooker; Gurney (the philanthropist) and his sister, Elizabeth Fry; Lindley (the botanist); and Harriet Martineau and her brother James.

See works by Stacy (1819), Bayne (1858), Goulburn (1876), Jarrold (1883), and Jessopp (1884); also those cited under Norfolk.

Norwich, capital of New London county, Connecticut, is at the head of the Thames River, 13 miles by rail N. of New London. The chief portion of the city lies on an eminence that rises between the Yantic and Shetucket rivers, which here unite to form the Thames. There are numerous manufactories of paper, cotton and woollen goods, worsted, picture cords, pistols, wood-type, files, locks, iron pipes, &c., besides rolling-mills and ironworks: abundant water-power is supplied by the branches of the Thames. Steamboats ply between Norwich and New York. The land on which the city stands was granted by Uncas the Mohican to an English ensign who in 1656 reached him by night with a canoe-load of provisions, when he was besieged in his stronghold by the hostile Indians, and nearly forced by hunger to surrender: a granite obelisk bearing the name of Uncas was erected in 1825. Pop. (1890) 16,152.

Norwood, a south suburban district of London, hilly, healthy, and pretty, long the seat until 1797 of a Gypsy settlement. Pop. 24,797. See A. M. Gale's *Norwood and Dulwich* (1890).

Nose, the organ of smell, and also part of the apparatus of respiration and voice. Considered anatomically, it may be divided into an external part—the projecting portion, to which the term *nose* is popularly restricted—and an internal part, consisting of two chief cavities, or *nasal fossæ*, separated from each other by a vertical septum, and subdivided by spongy or turbinated bones projecting from the outer wall into three passages or *meatuses*, with which various cells or *sinuses* in the ethmoid, sphenoid, frontal, and superior maxillary bones communicate by narrow apertures.

Fig. 1.—Longitudinal Section of the Nasal Fossæ of the Left Side, the Central Septum being removed:

1, frontal bone; 2, nasal bone; 3, part of ethmoid bone; 4, sphenoidal sinus. *a*, superior turbinated bone; *b*, superior meatus; *c*, middle turbinated bone; *dd*, middle meatus; *e*, inferior turbinated bone; *ff*, inferior meatus; *gg*, a probe passed into the nasal duct.

The external portion of this organ may be described as a triangular pyramid which projects from the centre of the face, immediately above the upper lip. Its summit or root is connected with the forehead by means of a narrow bridge, formed on either side by the nasal bone and the nasal process of the superior maxillary bone. Its lower part presents two horizontal elliptical openings, the *nostrils*, which overhang the mouth, and are separated from one another by a vertical septum. The margins of the nostrils are usually provided with a number of stiff hairs (*vibrissæ*), which project across the openings, and serve to arrest the passage of foreign substances, such as dust, small insects, &c., which might otherwise be drawn up with the current of air intended for respiration. The skeleton or framework of the nose is partly composed of the bones forming the top and sides of the bridge and partly of cartilages, there being on either side an upper lateral and a lower lateral cartilage, to the latter of which are attached three or four small cartilaginous plates, termed sesamoid cartilages; there is also the cartilage of the septum which separates the nostrils, and in association posteriorly

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with the perpendicular plate of the ethmoid, and with the vomer, forms a complete partition between the right and left nasal fossæ. It is the lower lateral, termed by some writers the alar cartilage, which by its flexibility and curved shape forms the dilatable chamber just within the nostril. The nasal cartilages are capable of being slightly moved, and the nostrils of being dilated or contracted by various small muscles.

The *nasal fossæ*, which constitute the internal part of the nose, are lofty and of considerable depth. They open in front by the nostrils, and behind they terminate by a vertical slit on either side in the upper part of the pharynx, above the soft palate, and near the orifices of the Eustachian tubes, leading to the tympanic cavity of the ear.

The mucous membrane lining the nose and its cavities is called *pituitary* (Lat. *pituita*, 'rheum'), from the nature of its secretion; or *Schneiderian*, from Schneider, the first anatomist who showed that the secretion proceeded from the mucous membrane, and not, as was previously imagined, from the brain; it is continuous with the skin of the face at the nostrils, with the mucous covering of the eye through the lachrymal duct (see EYE), and with that of the pharynx and middle ear posteriorly. This membrane varies in its structure in different parts of the organ. On the septum and spongy bones bounding the direct passage from the nostrils to the throat the lining membrane contains ample and capacious submucous plexuses of both arteries and veins, of which the latter are by far the more large and tortuous. These plexuses, lying as they do in a region exposed more than any other to external cooling influences, appear to be designed to promote the warmth of the part, and to elevate the temperature of the air on its passage to the lungs. They also serve to explain the tendency to hemorrhage from the nose in cases of general or local plethora. In this, the respiratory part of the nose, the mucous membrane

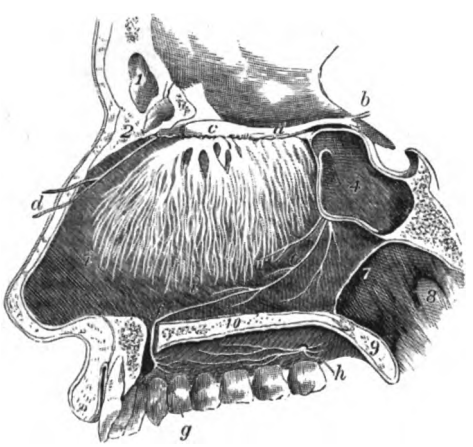

Fig. 2.—Distribution of the Olfactory Nerve on the Septum of the Nose:

1, frontal sinus; 2, nasal bone; 4, sphenoidal sinus of left side; 7, posterior opening of the left nostril; 8, opening of Eustachian tube; 9, section of soft palate; 10. section of hard palate. *a*, olfactory nerve; *b*, its three roots; *c*, its bulb; *d*, nasal branch from the ophthalmic division of the fifth nerve; *e*, naso-palatine nerve; *g*, *h*, its branches; *i*, the septum of the nose.

is lined by ciliated epithelium. In the upper third of the nose—which, as the proper seat of the sense of smell, may be termed the *olfactory region*—the mucous membrane is very thick and coloured by a brown pigment. The olfactory nerve, or nerve of smell, terminates in the olfactory mucous membrane. It passes into the nasal cavity in several small branches; these ramify in the soft mucous membrane (fig. 2), and end in tiny varicose fibres which terminate in elongated epithelial cells projecting into the free surface of the nose. These cells—the olfactory cells—which in some animals are provided with little hairs, are affected by odorous particles, and the excitement thus set up travels to the brain by the branches of the olfactory nerve. In order to smell a substance it must be in the form of vapour. A scent such as Eau de Cologne when poured into the nostril is odourless; its little particles must be disengaged, and be carried freely by the atmosphere into the nasal cavity before we are affected by its odour. So sensitive is the nose, however, that odorous particles of inconceivable smallness are capable of producing powerful sensations. When we remember that a grain of musk will scent the air in its neighbourhood for years, and that this can only be by the continual loss of particles of its substance, these particles must be infinitely minute. Still more wonderful is the development of the sense of smell in many of the lower animals. A hare passes rapidly over the ground and the scent will under favourable circumstances remain for hours, and be sufficiently strong to enable the well-trained harrier to follow it with unerring accuracy. In savage tribes the sense of smell is vastly more acute than among civilised nations; nevertheless by practice it is possible for any one to cultivate this sense to a very considerable extent. Well-authenticated cases are recorded of persons obliged by the loss of the other senses to train this, the only one left for their use, to such a degree of acuteness that they have been able to recognise both objects and persons by the sense of smell alone.

Most persons imagine that we are largely beholden to 'taste' for our gustatory pleasures. In reality our sense of taste only enables us to distinguish sweet from sour or bitter, and all the flavour of the food or wine is smelt. Close the nose and shut the eyes, and one cannot distinguish port from sherry, a raw potato from an apple, or beef from mutton.

Until recent years it was impossible to connect the *quality* of a smell with the *kind* of substance that produced it. In hearing and sight the character of the vibrations—of air or ether—determines the kind of sensation. The sound peculiar to the violin or piano depends entirely on the character of the sound vibrations given out by them. The rose appears red because it reflects to the eye vibrations which are chiefly characterised by their big oscillations. The writer of this article has been able to establish a similar relationship between the character of a smell and the character of the vibrations associated with odorous particles. He finds, in studying the odours of elements and their compounds, that in the 'Groups' of Mendeleëff (see ATOMIC THEORY, Vol. I. p. 552) the odours are similar or vary with the atomic weight of the element. Exactly similar properties in respect to the production of colour sensations have been observed by Carnelly.

DISEASES OF THE NOSTRILS.—Acute inflammation of the nasal mucous membrane has been already described under the title of Catarrh (q.v.); the conditions which cause an offensive smell from the nostrils are discussed in the article OZŒNA; and Polypus is a separate article.

Hemorrhage from the Nostrils, or *Epistaxis* (Gr., 'a dropping'), is by far the commonest form of bleeding from a mucous membrane. It may be produced by direct injury, as by a blow on the nose, or a scratch in the interior of the nostrils; and by other local conditions, as ulcerations or

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morbid growths in the nasal cavity. According to Sir Morell Mackenzie, 'constitutional causes are of four kinds: (1) the blood itself may be diseased; (2) the vessels may be diseased; (3) there may be obstruction to the circulation through the lungs, liver, kidneys, or other organs, causing a sudden tension or strain of the whole system, which gives way at a weak part—viz. the nose . . .; (4) the blood-flow may be a vicarious discharge' (*Diseases of the Throat and Nose*). It is most common in children and young adults, least so in the prime of life. It is much more often met with in the male sex than the female. The bleeding usually occurs drop by drop, but may be very profuse. Sir Thomas Watson wisely says: 'Sometimes it is a remedy; sometimes a warning; sometimes in itself a disease.' The first question to be considered therefore in any particular case is whether the hemorrhage ought to be arrested. Generally speaking, in plethoric children and young people, in cases of venous obstruction, and in vicarious hemorrhage, it should not be stopped unless the loss of blood prove excessive.

When it is desirable to arrest the hemorrhage the patient should be placed in the sitting posture at an open window, with the head erect or slightly inclined backwards; and amongst the simpler means to be first tried are compression of the nostrils by the fingers, maintained for five or ten minutes, the application of a key or other piece of cold metal to the back of the neck, and the bathing of the face or whole head with cold water, especially if accompanied by a drawing-up of the water into the nostrils; should these means fail, recourse must be had to astringent injections (for example, twenty grains of alum dissolved in an ounce of water) thrown up the nostrils by a syringe, or to astringent powders (as finely-powdered galls, kino, matico, alum, &c.) blown up the nostrils by means of a quill or other tube, or snuffed up by the patient. As a final resource the nostrils must be plugged with strips of lint, absorbent wick, or a piece of sponge. Cases occasionally occur in which it is necessary also to plug the posterior orifices of the nostrils by an operation, into the details of which it is not necessary to enter.

Post-nasal Catarrh is a chronic and very troublesome disease, most common in America, especially the United States; so much so that it is there usually called simply catarrh, and elsewhere is sometimes spoken of as American catarrh. The symptoms are discomfort at the back of the nose, leading to frequent 'hawking' to clear away the tenacious mucus which is formed there, and sometimes indistinctness in articulation. The causes are not well understood: Sir Morell Mackenzie believes that the chief is the inhalation of irritating dust. Treatment must be chiefly directed to the local condition; alkaline sprays or washes should be used to remove the adherent secretion, and then an astringent powder or a thin ointment snuffed up the nostrils: catechu, red (Eucalyptus) gum, or sulphate of iron, diluted with starch, and soft vaseline, either alone or with one-eighth of finely-powdered boracic acid, are among the most useful applications. Health otherwise defective may indicate the importance of constitutional treatment; and change of climate is sometimes useful.

When the nose or a portion of it has been destroyed by disease or accident, the defect may be partly made good by the Rhinoplastic (q.v.) operation.

See Sir Morell Mackenzie, *Diseases of Throat and Nose* (1884); Cresswell Baber, *Guide to Examination of Nose* (1886); Greville Macdonald, *Diseases of the Nose* (1890).

Nosology (Gr. *nosos*, 'disease') is that branch of medicine which treats of the distribution and arrangement of diseases into classes. See DISEASE.

Nossi-Bé, or NÒSIBÉ, a volcanic mountainous island on the north-west coast of Madagascar (q.v.), belonging to the French. It has an area of 115 sq. m. and a pop. of 11,299.

Nostalgia (Gr. *nostos*, 'the return home;' *algos*, 'pain'), a technical term for home-sickness which, when as sometimes it takes the form of acute melancholia, becomes ruinous to health, and even fatal. It is said that inhabitants of mountainous countries suffer more keenly than others; but it seems to have less to do with affection for the physical features of home than with inability to break with old habits and modes of life. In armies it has been found necessary to adopt measures to prevent desertion on this ground. In Canada the playing of *Lochaber no More* by the pipers of Highland regiments had to be interdicted; and so in France it was forbidden under pain of death to sing or play the *Ranz des Vaches* in the hearing of Swiss mercenaries.

Nostoc, a genus of plants of the natural order Algæ, sub-order Confervaceæ, found upon moist ground, rocks near streams, &c., and consisting of a somewhat gelatinous hollow tumid frond, filled with simple filaments resembling strings of beads. *N. commune* is frequent in Britain, springing up suddenly on gravel-walks and pasture-grounds after rain. It is a trembling, gelatinous mass, often called Star Jelly, and vulgarly regarded, owing to the suddenness with which it makes its appearance, as having fallen from the skies, and as possessed of important medicinal virtues. *N. edule* is employed in China as an article of food.

Nostradamus, the assumed name of Michel de Notredame, an astrologer of Jewish descent, who was born at St Remi in Provence, 14th December 1503. He studied at Avignon, and next medicine at Montpellier, took the degree of doctor of medicine in 1529, and practised the profession at Agen, afterwards at Salon near Aix. Next year when the plague was raging at Lyons he was conspicuous for his skill and devotion. He first fell upon his prophetic vein about the year 1547, but in what light he himself regarded his pretensions it is now impossible to say. The first collection of famous *Centuries* appeared at Lyons in 1555. These were predictions in rhymed quatrains, divided into centuries, of which there were seven; the second edition, published in 1558, contained ten. Astrology was then the fashion, and these quatrains, expressed generally in obscure and enigmatical terms, brought their author a great reputation. Catharine de' Medici invited him to visit her at Blois; the Duke and Duchess of Savoy went to Salon expressly to see him; Charles IX. on his accession appointed him his physician-in-ordinary. Nostradamus died at Salon, 2d July 1566. His predictions have given rise to a vast illustrative or controversial literature. The *Centuries* were formally condemned by the papal court in 1781.

See Jaubert's *Vie de M. Nostradamus, Apologie et Histoire* (Amst. 1656); Haitze's *Vie de Michel Nostradamus* (Aix, 1712); Astruc's *Mémoires pour servir à l'Histoire de la Faculté de Montpellier* (Paris, 1767); *Apologie pour les Grands Hommes Soupçonnés de Magie* (Paris, 1825); and E. Bareste's *Nostradamus* (Paris, 1842).

Notables, the name formerly given in France to persons of distinction and political importance. As the States-general were inconvenient to the despotism of the monarchy, the kings of the House of Valois adopted the expedient of calling in their stead *Assemblies of the Notables*, the time of calling them and the composition of them being entirely dependent on the pleasure of the crown. For more than a century and a half even this poor acknowledgment of any other mind or will in the nation

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than that of the sovereign ceased to be made; but when the state of the finances brought the monarchy into difficulties and perils Louis XVI., at the instigation of the minister Calonne, had recourse again to an Assembly of Notables, which met 22d February 1787, and was dissolved 25th May. It consisted of 137 members, among whom were seven princes of the blood, nine dukes and peers, eight marshals, eleven archbishops, twenty-two nobles, eight councillors of state, four masters of requests, thirty-seven judges, twelve deputies of the Pays d'États, the civil lieutenant, and twenty-five persons belonging to the magistracy of different cities. See LOUIS XVI., NECKER, FRANCE.

Notary-public is an officer of the law or professional person whose chief function is to act as a witness of any solemn or formal act, and to give a certificate of the same; which certificate, if duly authenticated, is accepted as good evidence of the act done in his presence, and attested by him. Solicitors are sometimes notaries-public, but in England there are fewer notaries, comparatively, than in Scotland, where notarial acts and certificates are more largely used. The English courts take notice of the seal of a notary, but his certificate is not generally received as proof of the facts certified. A notary is employed in the noting and protest of foreign bills of exchange in case of non-acceptance or non-payment. In the United States the powers of notaries are defined by the laws of the different states. See Brooke, *On the Office of a Notary* (ed. by Leone Levi, 1876); and Proffatt, *Law of Notaries-public in the United States* (1877).

Notation. For Chemical Notation, see CHEMISTRY; for Musical Notation, MUSIC, SOLFEGGIO; for Mathematical Notation, NUMERALS, ALGEBRA, CALCULUS, GEOMETRY, QUATERNIONS.

Noto, an ancient episcopal town of Sicily, 16 miles SW. of Syracuse by rail. Pop. 15,925.

Notochord. See EMBRYOLOGY, AMPHIOXUS.

Notornis, one among many of the family of Rails, with wings so much reduced as to be incapable of flight, and which have within historical times become partially or completely extinct. Notornis inhabited New Zealand, and within the 19th century three specimens have been taken, one of them in 1881, so that possibly there are still a few survivors in out-of-the-way districts.

Nototherium, a genus of gigantic fossil kangaroo-like marsupials, found in Australia.

Not Proven. See CRIMINAL LAW.

Notre Dame (Old Fr., 'Our Lady'), the name of many churches dedicated to the Virgin Mary in France, particularly the cathedral of Paris.

Nottingham, a town of England, the capital of Nottinghamshire, and a parliamentary, municipal, and county borough (the first returning three members), is seated on the Trent, 126 miles NNW. of London, 15 E. of Derby, and 38 S. by E. of Sheffield. Formerly surrounded by ancient walls (910–1265), of which all traces have now disappeared, the town covers an area of about 16 sq. m., and its appearance of late years has been much improved by the widening of its streets; by the erection of a new town-hall, University College, and other public buildings; by the opening and laying out of an arboretum of 17 acres, of a public park and recreation grounds of over 150 acres, and of a tract of open land, called 'Bulwell Forest' (135 acres); as also the spanning of the Trent—which is here about 200 yards wide—with a broad granite and iron bridge in the place of a former narrow structure of seventeen arches. Crowning a precipitous rock, which rises 133 feet above the river, stands the castle, built (1674–83) on the site of an ancient Norman fortress, dismantled during the Parliamentary wars, and itself much damaged by fire during the Reform Bill riots of 1831. It was restored in 1878, and transformed into an art museum. Near to it are the county hall (1770); St Mary's Church (restored 1867–85), a cruciform building in the Perpendicular style, 216 feet in length; and a spacious market-place, 5½ acres in extent, having at its eastern end the exchange, with a richly-decorated façade (rebuilt 1814). In another group not far off are the guildhall and other municipal offices (1888), in the French Renaissance style of architecture; two theatres (1865–84); and University College (1879–81), mainly a science school, but accommodating in its wings a free library and natural history museum. Other edifices worthy of mention comprise a hospital (1781, with additions 1829–79); a Roman Catholic cathedral (1844), cruciform and Early English; and the high school, founded as a grammar or free school in 1513, moved into new buildings in 1867, and since 1882 controlled under a new scheme; it has a large income from endowment, and annually offers for competition eight exhibitions of an aggregate value of £435, besides numerous scholarships. On the outskirts of the town race-meetings were held annually in March and October for a hundred years until 1890; the Trent Bridge cricket-ground is the scene of the county's home matches; whilst mention must not be omitted of the annual goose fair held at Michaelmas. Of the various manufactures carried on in the town the most important are those of lace and hosiery; baskets, bicycles, cigars, and needles are also made, whilst several iron-foundries are in operation, and malting and brewing are extensively carried on. One of the most successful sewage farms in the country has been laid out 5 miles from the town, the whole of whose sewage is here dealt with. Pop. (1801) 28,801; (1831) 50,220; (1881) 186,575; (1891) 211,984. In the history of Nottingham (which was one of the Five Boroughs) the principal incidents have been its occupation by the Danes, and their withdrawal on the conclusion of a treaty for peace (868); its destruction by fire (1140 and 1153); the granting of its first charter (1155); the convening here of three parliaments (1330–37); the appointment of its first suffragan bishop (1534); the raising by Charles I. of his standard at the commencement of the Parliamentary war (1642); and riots (1795–1816), partly on account of a bread famine and partly owing to the Luddites (q.v.). See local works by Dickinson (1816), Wylie (1853–65), Hine (1876), and W. H. Stevenson (4 vols. 1890), besides those cited under the county.

Nottinghamshire, or NOTTS, an inland county of England, bounded on the N. by Yorkshire, E. by Lincolnshire, S. by Leicestershire, and W. by Derbyshire. Its greatest length is 50 miles; average breadth, 20 miles; and area, 824 sq. m., or 527,752 acres. Pop. (1801) 140,350; (1831) 225,400; (1881) 391,815; (1891) 445,599. Apart from the valley of the Trent, which is very flat, the general aspect of the county is undulating and well wooded, the highest ground—600 feet above the sea-level—being in the west, in the vicinity of Sherwood Forest (q.v.). In the south are the Wolds, consisting of upland moors and pasture-lands broken up by many fertile hollows, whilst the northern boundary for upwards of 15 miles is skirted by the Car, a tract of low-lying land, formerly a swampy bog, but since 1796 drained and brought into cultivation. The Trent, with its tributaries, the Erewash, Soar, and Idle, is the principal river; and the Fosse Dyke and Notts and Grantham canals, and Midland, Great Northern, and Manchester, Sheffield and Lincoln railways also traverse the county. The climate, especially in the east, is remarkably dry, and the soil varies, sand and gravel, clay, limestone, and coal-land prevailing

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in different districts. As regards productiveness it is not above mediocrity, except in the Vale of Belvoir to the east of Nottingham. Of the total area under cultivation in 1889 corn and green crops covered 175,924 acres, and permanent pasture 202,178, whilst 2780 acres were laid out as orchards and market-gardens. The cultivation of hops has been discontinued. The principal mineral products are coal—of which 6,582,582 tons were raised in 1889—gypsum, iron ore, and limestone. The manufactures are noticed under the chief towns—viz. Nottingham, Newark, Mansfield, Retford, and Worksop, the two former also being the scene of most of the historical events connected with the county. Lying wholly in the diocese of Southwell, Notts is divided into six wapentakes, nine poor-law unions, and 273 parishes, and returns seven members to parliament, one for each of its four divisions (Bassetlaw, Newark, Mansfield, and Rushcliffe), and three for Nottingham (its capital and assize town). The county council consists of sixty-eight members. Of its natives the best known are Archbishops Cranmer, Secker, Sterne, and Manners-Sutton; Garnet (the Jesuit); Denzil Lord Holles; General Ireton, and his contemporary Colonel Hutchinson; Lady Mary Wortley Montagu; Bishop Warburton; Dodsley, Kippis, and Wakefield (the authors); Admiral Earl Howe; Sandby and Bonington (the artists); Dr Erasmus Darwin; Edmund Cartwright; Fynes Clinton (the scholar); Kirke White and Bailey (the poets); Lord Byron; 'Speaker' Denison; and 'General' Booth. See the county histories by Thoroton (3 vols. 1797), Bailey (4 vols. 1852–55), Briscoe (1881), and White (1885).

Noumea, capital of the French penal colony of New Caledonia (q.v.). Pop. 5000.

Noun. See GRAMMAR.

Noureddin. See NUR ED-DIN.

Novalis, the pen-name of Friedrich von Hardenberg, German writer, who was born at Wiederstedt, near Mansfeld, in Prussian Saxony, 2d May 1772. Whilst being educated at Jena, Leipzig, and Wittenberg he came under the influence of Schiller, and became acquainted with Fichte, Fr. Schlegel, and Tieck, studied deeply the works of Boehme, and imbued himself with the spirit of Romanticism to such an extent that he was afterwards designated the 'Prophet of Romanticism.' He made his start in life as a mining official. At Weissenfels (1795) he fell in love with a beautiful young girl, whose early death left a lasting impression upon him. Ere many years were past he himself, delicate from his boyhood up, was seized with consumption, and died 25th March 1801. The principal tenets of his two philosophical romances, both left incomplete, *Heinrich von Ofterdingen* and *Lehrlinge zu Sais*, were that life ought to be poetry realised in practical conduct, and that there are in the universe many verities and realities the truth of which cannot be grasped by the cold, critical intellect; they can only be known by the sympathetic intuition of feeling. His *Hymnen an die Nacht* are a glorification of his sorrow at the loss of his mistress. These, together with his *Poems* and *Sacred Songs*, are the only finished productions he has left. Novalis penned many thoughtful and suggestive sentences, often in very graceful language; but on the whole his writings lack precision of thought and robust common sense; their prevailing atmosphere is a mystic twilight, where is much obscurity, but also much beauty and much deep feeling. His *Sämmtliche Werke* (2 thin vols.) were published by Tieck and Fr. Schlegel in 1802. To these a third volume, containing a supplement to the Life printed in vol. i., together with poems and philosophic fragments by Novalis, was added in 1846. See Carlyle's *Miscellaneous Essays* (vol. ii.), the German Life of Novalis published at Gotha (2d ed. 1883), and his correspondence with the Schlegels (Mainz, 1880).

Novara, capital of a North Italian province, 60 miles N. of Turin by rail, with several fine churches, a trade in silk, grain, and wine, and manufactures of silk, cotton, and linen. Here the Sardinians were utterly defeated by the Austrians under Radetzky, on 23d March 1849. Pop. 19,557.

Nova Scotia, a province of the Dominion of Canada, lying between 43° 25′ and 47° N. lat. and 59° 40′ and 60° 25′ W. long., consists of a long, narrow peninsula, and the island of Cape Breton, which is separated from the mainland by the Strait of Canso. It is bounded on the N. by Northumberland Strait (which separates it from Prince Edward Island) and by the Gulf of St Lawrence; NE., S., and SE. by the Atlantic Ocean; W. by the Bay of Fundy; and NW. by New Brunswick, with which it is connected by an isthmus only 11 miles wide, separating the Bay of Fundy from Northumberland Strait. Across this isthmus is the Chignecto Ship-railway (1889–92).

The greatest length of the province is 350 miles, the greatest breadth about 120 miles, and the area 20,907 sq. m. (13,380,480 acres)—one-third less than that of Scotland. It is estimated that about one-fifth part of the area consists of lakes, rivers, and inlets of the sea. About 5,000,000 acres are fit for tillage; about 1,839,020 acres are in crop and pasture, and 21,624 acres are devoted to fruit cultivation. Pop. (1806) 67,515; (1851) 276,117; (1871) 387,800; (1891) 450,523.

The coast-line is about 1000 miles in length, and the shores abound with excellent harbours, of which the chief are Halifax Harbour, Chedabucto, St Margaret's, Mahone, and St Mary's bays, Annapolis, Mines, and Chignecto basins, and Victoria Harbour. There are numerous rivers, but few of them are more than 50 miles long. The most important are the Avon, Annapolis, and Shubenacadie. Of the rivers of Nova Scotia fifteen flow into the Northumberland Strait, four into St George's Bay, seventeen into the Atlantic, and twenty-four into the Bay of Fundy. Among the lakes the chief is Great Bras d'Or Lake (which is really an inland sea), about 50 miles long, and with an area of about 500 sq. m., and a depth of water varying from 12 to 60 fathoms. The next largest lakes are Lake Rossignol, 20 miles in length; Ship Harbour, 15 miles long; Grand Lake, and College Lake. The most remarkable body of water in the province is Mines Basin, the east arm of the Bay of Fundy, penetrating 60 miles inland, and terminating in Cobequid Bay. The tides rise in the basin with great impetuosity, and form what is called a 'bore.' At the equinoxes they have been known to rise from 40 to 50 feet. On an average, however, the rise is about 30 feet, while in Halifax Harbour, on the opposite side of the coast, the spring-tides rise only from 6 to 8 feet. The country is beautifully variegated by ranges of hills and broad valleys, both of which run longitudinally through the province. The Cobequid range of mountains, as they are called, run through the interior of the province. On each side of these mountains are two extensive ranges of rich arable lands. The Annapolis valley is especially favourably situated, and is noted for the magnificent apples grown there. The southern part of Cape Breton is very much the same in appearance as the northern part of the mainland, but the northern part of the island is bold and steep, the land at North Cape being 1800 feet above the sea-level. The distance from North Cape to Cape Ray on the Newfoundland coast is 48 miles.

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The principal cities and towns are Halifax (40,000), Dartmouth (4000), Yarmouth (6000), Truro (7000), Pictou (5000), Amherst (4000), Windsor (8600), Kentville (4000), Annapolis (2000), and Digby (1500). The climate of Nova Scotia is remarkably temperate considering its northern latitude. The extreme of cold is 20° below zero, and the extreme of heat 98° in the shade. The western counties average from 6 to 8 degrees warmer than the eastern, and in Annapolis county the mercury rarely falls below zero. Vegetation is very rapid, and the autumn forms a delightful season. Spring is rather tedious, and the winter variable. Fogs are prevalent along the coasts, but do not penetrate inland to any extent.

Agriculture and horticulture are among the principal industries in the province. Rye, oats, and barley, buckwheat, Indian corn, tomatoes, potatoes, turnips, and all root-crops grow in abundance. Wheat is not grown to any great extent, although there is nothing to prevent its cultivation. Apples, pears, plums, cherries, and other garden fruits attain the utmost perfection. The apple-orchards in Annapolis and King's counties are very productive. They extend along the roadside in an unbroken line for 50 miles, and in the autumn form a sight which, once seen, is not soon forgotten. More attention is now being devoted to dairying and to the raising of live-stock than was formerly the case. The manufactures of the province are yet limited, but are being developed. Cottons and woollens are manufactured in various parts of the country. There are ironworks at Londonderry, steel-works at New Glasgow, and stove and hardware works at Amherst; and there are also several sugar-refineries, paper-mills, boot and shoe and other manufactures of leather, manufactories of agricultural and other machinery, furniture and wooden ware, and many sawmills. The shipbuilding industry was formerly a most important one, but has suffered from the substitution of iron for wooden vessels. Endeavours are, however, being made to develop the iron shipbuilding trade. Mining is extensively carried on. The annual production of gold has risen from 16,000 oz. in 1884 to 26,000 oz. in 1889; and the total yield from the time mining was commenced is recorded as 482,316 oz. The average yearly earnings per man are stated to be £135. Coal and iron are abundantly distributed and extensively worked; and the manufacture of iron and steel is likely to be much increased. Upwards of 1,500,000 tons of coal are raised annually, and are sent to different parts of Canada, the West Indies, and South America. Notwithstanding that the export of coal to the United States fell off considerably when the reciprocity treaty with that country came to an end in 1866, the output of coal has increased year by year, the falling off in the United States trade being more than counterbalanced by the great increase in the consumption in the Dominion. Other minerals are also abundant, including tin, silver, manganese, gypsum, slates, and several varieties of precious stones. The fisheries of Nova Scotia are regarded as among the finest in the world. A large number of men and boats are engaged in the industry, which is valued at from seven to eight million dollars annually. The waters abound with mackerel, cod, herring, shad, salmon, halibut, haddock, lobsters, &c. The value of the imports into Nova Scotia in 1889 was $9,700,909, of which $4,022,007 came from Great Britain, and $2,848,007 from the United States. The exports in the same year were valued at $8,832,281, of which $2,011,982 went to Great Britain, $2,729,547 to the United States. The chief exports are fish-products, minerals, lumber, agricultural products, and general manufactures.

There are 700 miles of railway in the province, and many new lines are projected. The province is connected with both the Canadian and United States railway-systems. There are two canals in the province, one from Halifax to Cobequid (not now in use), and the other connecting St Peter's Bay and Bras d'Or Lake. The Chignecto Ship-railway, already referred to, is meant to carry ships by railway over the isthmus of Chignecto, so as to avoid the long detour necessary to pass from the Gulf of St Lawrence to the Bay of Fundy and the United States by way of the Nova Scotia coast.

The religious denominations according to the census in 1881 were as follows: Roman Catholics, 117,487; Presbyterians, 112,488; Baptist, 83,761; Church of England, 60,255; Methodist, 50,811. Education is free, and there are numerous public schools and academies, besides a normal and middle school, several convents, and the following six colleges: Dalhousie College and University, St Mary's College (Roman Catholic), and the Presbyterian College, Halifax; Acadia College (Baptist), Wolfville; St Francis College (Roman Catholic), Antigonish; and King's College and University, Windsor. The last, belonging to the Church of England, was founded in 1787.

The public affairs of the province are administered by a lieutenant-governor, and executive council of nine members, and a legislative assembly of thirty-eight members elected by the people for four years. The province is represented in the Dominion parliament by ten senators and twenty-one members of the Lower House. The annual revenue of the province in 1888 was $712,951, of which $432,867 represented the contributions from the Dominion treasury, under the terms by which Nova Scotia became a member of the Confederation; the rest was made up of mining royalties, receipts from crown-lands, &c. The expenditure in the same year was $668,400.

The government offer land on reasonable terms—100 acres for $40. The wild land is, however, covered with bush, and has to be cleared before cultivation is possible. Improved farms can be purchased in different parts of the province at prices ranging from $4 to $20 per acre, including buildings, &c. Excellent shooting and fishing are to be found all over the province, especially in the less accessible parts, where big game is still fairly abundant.

History.—Nova Scotia was first visited by Cabot in 1497, and the first colonisation recorded is that in 1604 of the French under De Monts, who attempted for some years to form settlements at Port Royal—now Annapolis—St Croix, &c. The settlers were finally expelled by the colonists of Virginia, who claimed the country by right of the discovery of Cabot. Other attempts were made at colonisation, but with small success. The country was ceded to France by the treaty of Breda in 1667; its possession, however, remained a source of contention between England and France, until it was finally ceded to England by the treaty of Utrecht in 1713. A memorable event in the history of the province was the expulsion of the Acadians (q.v.) in 1755, some of the events connected with which are the subject of Longfellow's *Evangeline.* Cape Breton was the scene of many struggles between the French and British, especially in the neighbourhood of Louisburg (q.v.). In 1763 it was annexed to Nova Scotia. It was subsequently made a separate province, but again united to Nova Scotia in 1819. Many attempts were made to develop the province, but the foundations of its present position date from the immigration in 1784 of the loyalists who preferred to take up their homes in British territory rather than remain under the dominion of the United States. The province of

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New Brunswick was created in 1784 out of Nova Scotian territory.

See Haliburton's *Nova Scotia* (1829), Murdoch's *History of Nova Scotia* (1867), Hannay's *Nova Scotia* (1879), Kingsford's *History of Canada* (1889), and the government handbooks.

Novatian, a priest of the Roman Church in the 3d century, and the leader of a sect called after his name. The place and time of his birth are not known with certainty. Novatian is said to have been a stoic philosopher, but after his arrival in Rome was converted to Christianity, and, being seized with sudden illness while still a catechumen, received what was called *clinical* baptism—i.e. baptism administered on a sick-bed and without the solemn ceremonial. Such baptism was in ordinary circumstances an impediment to holy orders. Notwithstanding this irregular baptism, Novatian was promoted to orders by Fabian the Roman bishop, and soon acquired great reputation by his learning and eloquence. Soon after the Decian persecution a great controversy arose about the manner of dealing with the lapsed—i.e. those who fell away during persecution. Novatian at first inclined to the milder side, but on the election of Cornelius to the Roman bishopric (March 251), and on Cornelius taking the indulgent course towards the lapsed, Novatian, together with Novatus and some other discontented priests of Carthage, opposed his authority, and eventually Novatian was chosen by a small party and actually ordained bishop in opposition to Cornelius. The party who espoused his cause was called by his name. They were confined mainly, in the first instance, to Rome and to Carthage, where a similar conflict had arisen. They held that in the grievous sin of idolatry through fear of persecution the church had no power to absolve the penitent; and therefore, although it does not appear that they excluded such sinners from all hope of heaven, yet they denied the lawfulness of readmitting them to the communion of the church. This doctrine they extended at a later period to all grievous sins of whatever character. In this view the church was merely a community of saints whose very existence is endangered by the presence of one sinner. Cyprian (q.v.), at first rigorous against the lapsed, gradually abated his severity.

Novatian may thus be regarded as the first antipope. The churches throughout Italy, Africa, and the East adhered to Cornelius; but the Novatian party set up bishops and established churches not only at Carthage, but at Constantinople, Alexandria, Nicomedia, in Phrygia, Gaul, Spain, and elsewhere. They claimed for themselves a character of especial purity, and assumed the appellation of Cathari (Puritans). The time and manner of the death of Novatian is uncertain. According to Socrates he died a martyr in the persecution of Valerian, but this is improbable. His sect survived long after his death. An unsuccessful effort was made in the Council of Nice to reunite them to the church; and traces of them are still discoverable in the East down to the end of the 6th century. See the *Letters* of Cyprian, Eusebius; also Walch's *Ketzerhistorie* (vol. ii.).

Nova Zembla (Russ. *Novaja Zemlja*, 'New Land'), an Arctic island lying between the Kara Sea and Barents Sea, and separated at its southern extremity from the island of Vaigatch by Kara Strait, 30 miles wide. Long and narrow, it measures 600 miles from north to south and 60 in average width, and is cut in two nearly midway up by a narrow winding sea-passage, the Matochkin Shar. The western side is broken by several bays, often studded with islands. The southern portion is apparently—little authentic is known about the interior—a plateau of moderate height; the centre and north are mountainous, rising to 4000 feet and perhaps higher, and are covered with snow and ice. The continuation of the Gulf Stream reaches the western shores and prevents them from being always icebound. Although not permanently inhabited, it is visited by Russian and Norwegian seamen and hunters for the capture of the numerous seafowl, whales, walrus, seals, and dolphins which frequent its coasts. It was known to the hunters of Novgorod in the 11th century, but was rediscovered by Sir Hugh Willoughby in 1553, and has been frequently visited since then, much scientific information about its animal and plant life having been collected since 1868. See Markham, *Polar Reconnaissance* (1881).

Novellæ. See JUSTINIAN.

Novello, VINCENT, musical composer and publisher, was born in London, of an Italian father and English mother, on 6th September 1781. He officiated as organist in various chapels in London, and was one of the founders of the Philharmonic and similar musical societies. His musical compositions, chiefly sacred, are considered to have contributed much to the improvement of cathedral music. But it is as a painstaking editor of unpublished works of eminent musicians that he deserves chiefly to be remembered. He died at Nice, 9th August 1861.—His daughter, CLARA ANASTASIA, a distinguished vocalist, was born in London in 1818; won great triumphs in the chief cities of Europe; but having in 1843 married Count Gigliucci, she quitted the stage in 1860.

Novels. 'Novel,' as the name of a thing, came to us with the thing itself from Italy early in the reign of Elizabeth. Boccaccio, from whom Painter took the 'excellent nouelles' in his *Palace of Pleasure*, applies 'novella' somewhat indiscriminately, and in his preface speaks of 'novels or fables or parables or stories' as if they meant pretty much the same thing; but in Provençal, and according to the *Cento Novelle Antiche*, 'noella' or 'novella' seems to have meant originally some new drollery, jest, or bon-mot—something, as Borghini explains, that pleased by its freshness, and the 'noellaire' or 'novellatore' to have been a kind of jester who collected and retailed such things. Most of the *Cento Novelle* and a large number of Boccaccio's, notably those of the sixth, seventh, and eighth days, are of this sort, and in the collections of Sacchetti and Ser Giovanni the proportion is still greater. In fact the primitive novella was something much more akin to the *facetiæ* of Poggio, the *Cent Nouvelles nouvelles*, the stories of the *Heptameron*, the *Hundred Merry Talys*, and even their humble relatives, the jests attributed to Joe Miller, than to the long, grave, and often tragic narratives that appeared under the title when it had grown elastic in the 16th century. But if 'novel' has departed from its original signification, 'romance' has wandered still farther. The word originally had nothing whatever to do with any form or species of composition. It was simply the name given in the middle ages to the spoken language of the commonalty, particularly in France and Spain, in contradistinction to the Latin or Letra, the language of the learned classes and the language used in documents and writings of all kinds. In time, however, it came to mean not only the vehicle but also the thing conveyed; anything in Romance was called romance, and naturally the term was extensively applied to the great source of popular recreation, the songs of the minstrels and *trouvères*, by which it was in the end almost monopolised. Hence the two meanings of 'romance' in Spanish—(1) the vernacular ('en buen Romance' is the precise equivalent of our phrase 'in plain English'); (2) a piece of popular

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narrative poetry such as we mean by the word 'ballad.' In France the place of the ballad was supplied by much longer and more elaborate compositions, like the *chansons de geste*, and to these the title of 'romans' was very generally given. But it is noteworthy that, 'romance' or 'romans,' it was applied, in Spain exclusively and in France all but exclusively, to compositions in verse, and that the prose-works which we now call the romances *par excellence* were not so styled in their own time. The romances of chivalry were called by their authors or editors chronicles, histories, or books; but, except in one edition of *Lancelot*, never romances; and the still more typical romances, the heroic romances of the 17th century, *Polexandre*, *Cassandre*, *Pharamond*, *Ibrahim*, and the like, seem to have been indebted to Scarron, but certainly not to their authors, for the name. Neither 'novel' nor 'romance,' in short, has any historical or etymological claim to stand for the latest development of prose fiction; nor is there any warrant for a distinction between the novel and the romance founded on a predominance of the real or the ideal, the ordinary or the extraordinary, the comic or the tragic, a distinction which, in practice, it would be impossible to draw. The names are purely conventional. What we call a novel the French call a *roman;* if they shared our somewhat contemptuous feeling for the romantic perhaps they would have followed our example, as we perhaps might have followed theirs if, instead of bad news, we talked of hearing bad novels.

For the origin of the thing so called there is no need to search very far. To ask where fiction came from, or what particular race or people were the inventors of it, is very much like asking who invented singing. If we must find a source for it, or fix it upon someone, a child in a corner telling a story to itself, with its playthings for *dramatis personæ*, or Maggie Tulliver unfolding the tale of the earwig's domestic troubles to her cousin Lucy, will be as near the fountain-head of fiction as we need go. The demand for fiction seems to follow very closely upon the demand for food. 'Tell me a story' is among the earliest expressions of our wants in life, and so far as we can see it has been one from time immemorial, and everywhere and always story-tellers of one sort or another are to be found striving as best they can to comply with the call. It is true that we cannot see very far back, and that our only available sources of information convey a very imperfect idea of story-tellers and story-telling in the remote past. The fragments and specimens that have come to us through tradition and literature can no more give a complete view of the fiction of the age they belong to than the fossils in a cabinet of the fauna and flora of the globe when they were living things. They have been preserved by accident, or by the possession of some property or feature conducing to preservation, while types and species less favoured have left no trace behind them of their existence. To take an example, every one at all acquainted with it must have noticed how strongly the didactic element asserts itself in early eastern fiction. By far the greater number of the specimens that have come down to us through the *Panchatantra*, *Hitopadesa*, Bidpai, Lokman, Æsop—for in strictness he must be counted among the Orientals—and other channels are fables with a moral attached. Now it is obvious that these cannot be the earliest type of fiction. Children call for stories, but not (in real life at least) for instruction or improvement until some years have passed over their heads; and what is true of children is true of humanity. But the very earliest productions of the fable family are entirely destitute of this appendage, and are mere stories told for their own sake. Properly they belong to a still earlier type than the fable, the story where animals and inanimate things speak and act like human beings, the immediate descendant, no doubt, of the story the child tells to itself about such objects as take its fancy (see BEAST-FABLES). It is easy to see how the moral came to be added, and how, once added, it became protective. The story furnished with a moral was preserved by and for the sake of its moral when those told for the story's sake alone dropped out of circulation; and in virtue of its moral it found its way into literature as soon as there was a literature to receive it. It is simply an instance of survival of the fittest; not necessarily of the best, but of the best fitted to survive in the struggle for existence.

The case of Æsop above referred to is an illustration of the connection between oriental and European fiction. Some critics maintain that he was an Oriental himself, and identify him with Lokman; but without going so far it may be safely said that the fables bearing his name are mainly of oriental origin, and from some source in common with the *Panchatantra*. But this is not the only instance. It is significant that, with scarcely an exception, Greek prose fiction came from Asia Minor, or from islands off the coast, and in most instances the Asiatic influence is distinctly perceptible. Of the Milesian tales we know little, but from that little it seems likely that they were compositions somewhat in the nature of the French fabliaux, and like them largely indebted to the eastern story-tellers. Iamblichus, the author of the *Babylonica*, and Heliodorus, the author of the more famous *Theagenes and Chariclea*, were both Syrians, and clearly drew their inspiration from the same quarter. Achilles Tatius, the follower of Heliodorus, was of Alexandria. Xenophon, who wrote the tale of *Abrocomas and Anthia*, was of Ephesus. *Josaphat and Barlaam* was by John of Damascus. Lucian was another Syrian, but he cannot be properly included among those who wrote stories for the story's sake, nor indeed among those distinctly influenced by eastern fiction, any more than the author of the graceful pastoral of *Daphnis and Chloe*, whoever he may have been, for 'Longus' is probably a mere clerical error. As M. Chassang says, in his *Histoire du Roman:* 'The taste for the romance passed from the East to Greece;' but it was to the artistic instinct of the Greeks that the novel or romance owed the remarkable development we see in *Daphnis and Chloe* and *Theagenes and Chariclea*. The taste passed into Italy also about the same time, but more probably through the medium of the Milesian and Sybarite tales than directly from the East; and it bore fruit in the *Satyricon* of Petronius Arbiter and the *Metamorphosis*, or *Golden Ass*, of Apuleius, in each of which the best-known episode is derived from an eastern story. The *Cupid and Psyche* of Apuleius and Petronius' *Widow of Ephesus* are found in divers forms, and of the latter there is even a Chinese variant.

The collection of fables, partly from the *Panchatantra* and *Hitopadesa*, called *Kalila wa Dimna* had a great share in the spread of oriental stories in the middle ages throughout western Europe, but chiefly in Spain, where, introduced probably by the Arabs, it helped to furnish material for the *Disciplina Clericalis* of Pedro Alfonso and the *Conde Lucanor* of Don Juan Manuel. But even more influential was a work that still circulates as a chap-book in most European countries, *The Seven Wise Masters of Rome*, which, under a variety of titles, *Erastus*, *Dolopathos*, *Syntipas*, *Sindebad Nameh*, *Sandabar*, *The Seven Vizirs*, and through Latin, Greek, Hebrew, Arabic, and Persian, may be traced back

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to Sanskrit. Such collections of fables, apologues, and tales, each in a setting more or less ingenious of its own, and borrowing freely from its predecessors—story-books of a class that has been made familiar by *The Thousand and One Nights*—were very numerous at the time, and served as a mine of oriental fiction to mediæval Europe. The *Gesta Romanorum*, which is in fact a European story-book on the oriental model, was largely indebted to this source, but not nearly so much as the fabliaux (properly 'fableaux,' diminutive of 'fables') of the trouvères, who found in the inventions of the eastern story-tellers precisely the sort of tale which their easy verse and *esprit gaulois* could readily adapt to the taste of their audiences. It was from the fabliaux that the Italian *novellieri*, from Boccaccio to Bandello, and not only they, but also the compilers of the *Cent Nouvelles nouvelles* and of the *Heptameron*, and the gay novel-writers of the 16th century in general, chiefly took their lightest, liveliest, most satirical, and sometimes most licentious tales; and in this way the fiction of the East came in numberless instances to be incorporated in the literature of Europe.

But the trouvères were at the same time laying the foundations of another very different species of novel. There were audiences for whom the fabliaux were too light and trivial, and who demanded a lay of a more serious and earnest character and of deeper interest, and for these they had the *chanson de geste*, a sort of minor epic, dealing for the most part with the deeds or adventures of some real or legendary hero, and standing in much the same relation to the fabliaux as tragedy, or at least serious drama, to light comedy and farce; and from these *chansons de geste* in process of time, as reading became a more common accomplishment, and books began to take the place of the lays of the minstrels, came the prose romance of chivalry. Not, of course, that every romance of chivalry had its origin in the verse of a trouvère; there is no evidence, for instance, that the story of Lancelot was ever the subject of a *chanson de geste*, though there can be little doubt that it furnished a theme for Welsh and Armorican ballads long before Walter Map took it in hand. But unquestionably the early romances of chivalry were as a rule made from earlier metrical romances, as these again, no doubt, from shorter and ruder pieces of verse; the process being, presumably, first legend or tradition, then ballads of some sort embodying incidents of the legend, then the isolated ballads connected, unified, and polished into a *chanson de geste* by a bard of a higher order, and finally the prose romance, sometimes curtailing, but oftener expanding the *chanson*. The process is well seen in the romances of the Charlemagne cycle: the connecting-link between the legend and the *chanson* has, of course, disappeared, but it has left its traces plainly visible in the *Chanson de Roland*, the germ of the whole; and we find the legends of Gascony and the Ardennes and of Charlemagne's troubles with his foes and vassals first furnishing a subject for the trouvère, and then passing into prose romances like *Huon de Bordeaux*, *Les Quatre fils Aymon*, *Fierabras*, and *Ogier le Danois*. Nor is it confined to the romances of chivalry proper, of Arthur and the Round Table and Charlemagne and the Peers; for the romances of the borderland between chivalry and faerie, *Parthenopex of Blois*, *The Knight of the Swan*, *Melusina* (q.v.), and the like, were all apparently sung by the trouvères before they sought readers in prose. See ROMANCES.

The Spanish family of romances of chivalry came into the world long after the age of the trouvères, though it is very likely that Amadis of Gaul, the founder of it, may have made his first appearance in verse. He is mediæval, but all his progeny, which includes not merely the Amadis series, but also the Palmerins and isolated romances, are of modern birth, and a connecting-link between the novel of the middle ages and the novel of our own day. They were the products of a variety of causes—the taste created by the Amadis, the recent invention of printing, which made such reading a comparatively cheap luxury, and, above all, the condition of Spain at the time. M. Chassang, in the book already quoted, has a remark not wholly complimentary to novelists and novel-readers, to the effect that story-telling flourishes most where the people are most idle. The peoples of the East were, and still are, the most prolific of story-tellers, because, living under paternal governments, they have always had a surplus of time upon their hands. The Greeks and Romans did without stories so long as their republics lasted, for his share in the affairs of the state gave each man employment enough for his spare time and thought, and it was not till Greece became subject to Rome and Rome to the emperors that the Greek and Latin romances came into existence. This theory, if we accept it, will account for the passion for romances that raged in Spain in the 16th century, until cured by the drastic remedy of Cervantes. The end of the great national struggle with the Moors, the establishment of the Inquisition, the absorption of all political power and authority by the sovereign, and the general stagnation in public life left the upper and middle classes to a great extent without occupation. Only a few could follow Cortes and Pizarro, and the majority had to resign themselves to inaction, made all the more irksome by the memories of a stirring past, and warm their blood as best they could with the imaginary adventures and sound and fury of the chivalry romances. The chief charge brought by every assailant of these productions, from Pedro Mexia to Cervantes, is that they infected their readers with their own extravagance, and made them think in their style and fancy themselves acting the scenes they read of. But this was the great attraction; they were indulged in, like bhang or opium, for the sake of the pleasant insanity that attended indulgence. Don Quixote's madness, if an extreme, was not a solitary case; and astute romancers, like Feliciano de Silva and Marcos Martinez, knew well that the stronger they made the dose the better they pleased their readers, and on principle kept them well plied with rant, bombast, and absurdity, and fooled them to the top of their bent.

But if Cervantes purged his country of sham chivalry, from the bonfire of Don Quixote's books—to borrow the witty image of M. Demogeot—'an unlucky phœnix rose up for the ennui of the 17th century,' the heroic romance, *Polexandre*, *Cléopatre*, *Cassandre*, *Ibrahim*, *Clélie*, and the rest. Another variety of romance, however, the pastoral, had some share in the genesis of the heroic romance. The Spanish pastorals, supposed by some to have been the descendants of *Daphnis and Chloe*, were in reality, through the *Arcadia* of Sannazaro, the offspring of the Renaissance worship of Virgil, of which were born all the pining shepherds and obdurate shepherdesses that haunt the poetry of the 16th century. For a time they disputed in a feeble way the ascendency of the chivalry romances, and were threatened with the same fate by Cervantes; but they were left to live out their innocent lives in peace and die at last of their own insipidity. To them, or rather to Montemayor's *Diana*, the first and best of them, we owe one of the patriarchs of the English novel, Sidney's *Arcadia*, and the French owe Honoré d'Urfé's *Astrée*, the precursor of the heroic romances. These were based partly

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on chivalry, partly on pastoral romance; their strength lay in their combination of sentiment and swagger, the latter borrowed from the chivalry romances, the former from the pastorals; and their one merit, perhaps, was that they provoked some excellent satires, such as Boileau's 'Héros de Roman,' Furetière's *Roman Bourgeois*, Sorel's *Berger Extravagant*, Scarron's *Roman Comique*, and Mrs Lennox's *Female Quixote*.

But a far more important variety of fiction came into existence in Spain in the time, and partly through the influence, of the chivalry romances. These were every day growing wilder and wilder and more and more regardless of all common sense and observance of decent probability, when a little book, called *The Life of Lazarillo de Tormes*, made its appearance. It did not pretend to be a satire or even a protest against the romances in fashion; it merely suggested that a story just as interesting and amusing might be got out of real, everyday life, without magicians, giants, flying dragons, or enchanted palaces, seeing that tastes varied, and that, as Jean Saugrain of Lyons put it in the French translation of 1560, it was not everybody that took delight in reading of heroic deeds. And in fact the *Lazarillo* is studiously unheroic, and the exact opposite of a romance of chivalry. The hero is a beggar boy, or rather a beggar-man's boy; hunger and thrashings are the dragons and giants he has to encounter; his adventures and achievements are cheating and outwitting his masters; the empire of Trebizond that crowns his career is the office of town-crier of Toledo, and the princess that bestows her hand upon him, the doubtful housekeeper of a sly old priest. It was the first genuine attempt at realism in literature, and for the first time in the history of fiction readers found themselves taking pleasure in the creations of the story-teller, not because they were remote from ordinary experience, but because they were familiar. Finding favour, as a matter of course it had successors. It was followed by the *gusto picaresco* novels, the tales of Spanish rogue and vagabond life, of which *Guzman de Alfarache*, *Marcos de Obregon*, and Quevedo's *Vida del Buscon* are the best-known examples. They took up with this phase of life partly in deference to the precedent of *Lazarillo*, partly because it was a life rich in adventures and incidents, but chiefly because it was a phase of life familiar and real to all readers in Spain in the 17th century. And not in Spain alone, apparently, for the truth of the picaresque novels seems to have been recognised wherever there were readers in Europe; the best of them were translated almost immediately into French, and very soon into English, Italian, German, and Dutch, and, as repeated editions show, took their place everywhere among the acknowledged purveyors of amusement. In Germany, indeed, they may be said to have laid the foundation of the novel in Grimmelshausen's *Simplicissimus*, and in England we need only turn to Defoe for proof of their influence. *Colonel Jack* and *Moll Flanders* are picaresque novels pure and simple, with their parentage stamped upon their features, and there are marks about *Captain Singleton* and *Roxana* that show them to be of the family.

But it was through Le Sage that the picaresque novel came to be influential in shaping modern fiction. Like a keen-eyed horticulturist who detects in some wild plant useful properties that may be indefinitely developed by cultivation, or germs that only need the gardener's skill to expand into endless varieties of form and colour, Le Sage saw the capabilities of this rough growth of Spanish humour, and how its asperities might be removed without impairing its virtues. It may be said it was no great discovery to perceive that disreputable life is not the only one that affords material available for a story of real life, that rascality and roguery are not the only qualities from which amusement may be extracted, and that whatever may be the artistic advantages of a scoundrel, there is on the whole more to be made of a hero who will be accepted by the reader as a man and a brother. But this is only what is said of every discovery as soon as men have come to look upon its consequences as matters of course. Great or small, however, this was Le Sage's discovery, and whether it was of importance or not the modern novel of real life and character will show. It would be difficult, perhaps, to define with precision the extent of Le Sage's share in the formation of this great necessary of 19th-century existence, but of its reality there can be no question. To take only one illustration out of many—in *David Copperfield* and elsewhere Dickens has left it on record that the favourite stories of his boyhood were *Roderick Random* and *Peregrine Pickle*, a training which shows its fruits in *Pickwick* and all his early works; but if *Gil Blas* was not in the same way Smollett's primer in fiction we have his own word for it that it was the model he set before him when he undertook to 'point out the follies of ordinary life.' This much, at least, cannot be disputed, that he was one of the great masters of the art of story-telling, the first to show an artist's knowledge of the value of details and the right use of realism, and the first to make clear the distinction between the novel and prose fiction in general. *Pantagruel* and *Gulliver's Travels* are not novels, not because the ordinary characteristics of the novel are wanting, but because Rabelais and Swift have merely assumed the disguise of a story-teller for the sake of gaining access to quarters otherwise inaccessible, precisely as Burton put on a pilgrim's dress in order to get into Mecca. In *Don Quixote* and *Robinson Crusoe* there may be just as little of the conventional features of the novel, but there is no disguise; they take their places among the novels unchallenged, while the title of *Tristram Shandy* must remain at least questionable, for though it may be called 'The Life and Opinions of Tristram Shandy,' it is in reality 'the freaks and grimaces of the Rev. Laurence Sterne.' Le Sage's theory, so far as we may infer one from his practice, seems to have been that to tell a story is the novelist's business, and to keep to it with singleness of purpose his duty as an artist.

In the foregoing necessarily brief outline of the history of the novel it will be seen that in its growth there has been at work a process very much like that which regulates other growths. One form springs from another, supplants it through being better adapted to surrounding circumstances, and lasts just so long as the adaptation lasts. In the novel, too, as in other cases, forms that have been in this way pushed aside have a tendency to reappear if circumstances favour them. The long-winded sentimental novels of the 18th century were only a reversion of the *romances de longue haleine* of the 17th in a soil that happened to suit them; and in the novels of Horace Walpole, Clara Reeve, and Mrs Radcliffe the spirit of the later romances of chivalry asserted itself, just as the spirit of the older and truer chivalry romance found expression in Scott. *Quentin Durward* is a genuine romance of chivalry, modified only by genius and modern influences. In its extraordinary powers of multiplication and variation also the latter-day novel seems to be subject to natural law. The varieties of wild animals and plants are few, and seldom strongly marked; but no sooner does man for his pleasure or comfort appropriate any living thing, dog or pig, rose or cabbage, than it acquires a

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variability and fertility apparently limitless. Thus it has fared with the novel ever since Le Sage undertook the domestication of an adaptable species. Having become not merely a source of amusement, but a necessary adjunct of modern life, it now rivals the rabbit in fecundity, and runs into varieties more widely different than greyhound, bulldog, and toy-terrier. This luxuriance of growth, however, cannot be regarded with unmixed satisfaction. It would be no small evil if the novel from an honoured branch of literature were to degenerate into a manufacture, and yet a certain tendency that way cannot be denied. Another, due to the same cause, is the tendency of the modern novel to usurp functions that do not properly belong to it. In some cases, to be sure, the pretence of lofty motives is sufficiently transparent. It is no more true that excursions into the slums of realism and naturalism have for their object the scientific study of social evils than that exhibitions of fasting men are got up in the interests of science. But the novel that is a preachment, a treatise, a dissertation in disguise, though less disingenuous and disagreeable, is no less an abuse. The prodigious development of novel literature in recent times seems to have led to overweening pretensions. We are sometimes told that the novelist has become the hierophant of the age, the teacher who holds the keys of philosophy, science, all human knowledge. But fine words will not alter facts. The *raison d'être* of the novelist is the old craving for a story, and those of the craft who have most frankly recognised this have always been those most beloved in their own generation and most honoured by posterity. Scott, the master of them all, claimed to be no more than a story-teller, and was proud of the title.

The best histories of the novel are Dunlop's *History of Prose Fiction* (1814; 3d ed. 1845; German trans., with large additions, by F. Liebrecht, 1851; a completely new edition by H. Wilson, 1888); O. L. B. Wolff's *Allgemeine Geschichte des Romans* (Jena, 1850); and Alexis Chassang's *Histoire du Roman, et de ses Rapports avec l'Histoire* (Paris, 1862). To these may be added D. Masson's *British Novelists and their Styles* (Camb. 1859); W. N. Senior, *Essays on Fiction* (1864); Landau's *Beiträge zur Geschichte der Italianischen Novelle* (Wien, 1875), and *Quellen des Dekameron* (2d ed. Stuttgart, 1884); Professor Erwin Rohde, *Der Griechische Roman und seine Vorläufer* (Leip. 1876); F. Bobertag's *Geschichte des Romans in Deutschland* (Breslau, 1876–79); B. Tuckerman, *History of Prose Fiction* (1882); H. Courthope Bowen's *Descriptive Catalogue of Historical Novels and Tales* (1882); S. Lanier, *The English Novel and Principles of its Development* (New York, 1883); Ten Brink, *Causerien over moderne Romans* (1885); Vte. E. M. De Vogüé, *Le Roman Russe* (2d ed. 1886); André Le Breton, *Le Roman au Dix-septième Siècle* (Paris, 1890); Huet's *Traité de l'Origine des Romans*; Lenglet du Fresnoy's *De l'Usage des Romans*, and *Bibliothèque des Romans*; and Bougeant's amusing satire on them, the *Voyage du Prince Fan-Férédin dans la Romancie*; M. Jusserand's *The English Novel in the Time of Elizabeth*; Quaritch's *Catalogue of Romances of Chivalry, &c.*; and for examples of fiction in its primitive form, Miss Frere's *Old Deccan Days* and Miss Stokes's *Indian Fairy Tales*.

The more important novelists of foreign lands are discussed in connection with the literature to which they belong in the sections on literature under the several heads, FRANCE, GERMANY, ITALY, SPAIN, NORWAY, RUSSIA, &c., and are also dealt with in separate articles in this work. It may, however, be convenient to append here a list of the more eminent British and American novelists, referring for details and criticisms to the articles on each of them.

BRITISH.

John Lyly (1553–1606).
Sir P. Sidney (1554–86).
Thomas Lodge (1556–1625).
Robert Greene (c. 1560–92).
Thomas Nash (1567–1601).
Aphra Behn (1640–89).

BRITISH.

Daniel Defoe (1660–1731).
Samuel Richardson (1689–1761).
Henry Brooke (1708–83).
Henry Fielding (1707–54).
Laurence Sterne (1713–68).
Sarah Fielding (1714–68).

BRITISH.

Horace Walpole (1717–97).
Tobias Smollett (1721–71).
Clara Reeve (1725–1803).
Oliver Goldsmith (1728–74).
Henry Mackenzie (1745–1831).
Madame D'Arblay (1752–1840).
Elizabeth Inchbald (1753–1821).
W. Godwin (1756–1836).
W. Beckford (1759–1844).
Mrs Radcliffe (1764–1823).
Maria Edgeworth (1767–1849).
Walter Scott (1771–1832).
Jane Austen (1775–1817).
M. G. Lewis (1775–1818).
Jane Porter (1776–1850).
John Galt (1779–1839).
James Morier (1780–1849).
Miss Ferrier (1782–1854).
T. L. Peacock (1785–1866).
T. Hook (1788–1841).
Captain Marryat (1792–1848).
J. G. Lockhart (1794–1854).
Mary W. Shelley (1797–1851).
G. P. R. James (1801–60).
Miss Martineau (1802–76).
Douglas Jerrold (1803–57).
Lord Lytton (1803–73).
Beaconsfield (1804–81).
W. H. Ainsworth (1805–82).
Charles Lever (1806–72).
Samuel Warren (1807–77).
Mrs Gaskell (1810–65).
Thackeray (1811–63).
Dickens (1812–70).
Charles Reade (1814–84).
Anthony Trollope (1815–82).
Charlotte Brontë (1816–55).
Emily Brontë (1818–48).
Charles Kingsley (1819–75).
'George Eliot' (1819–80).
Anne Brontë (1820–49).
Mrs Henry Wood (1820–87).
Whyte Melville (1821–78).
Mrs Lynn Linton (b. 1822).
Miss Yonge (b. 1823).
Julia Kavanagh (1824–77).
Wilkie Collins (1824–89).
George Macdonald (b. 1824).
Annie Keary (1825–79).
R. D. Blackmore (b. 1825).
Mrs Craik (1826–87).
George Meredith (b. 1828).

BRITISH.

Mrs Oliphant (b. 1828).
G. A. Sala (b. 1828).
Lawrence Oliphant (1829–90).
Henry Kingsley (1830–76).
Justin M'Carthy (b. 1830).
James Payn (b. 1830).
Miss A. B. Edwards (b. 1831).
Edmund Yates (b. 1831).
J. H. Shorthouse (b. 1834).
Miss Betham-Edwards (b. 1836).
Miss Braddon (b. 1837).
Rhoda Broughton (b. 1837).
Miss Thackeray (b. 1837).
Walter Besant (b. 1838).
Thomas Hardy (b. 1840).
'Ouida' (b. 1840).
William Black (b. 1841).
W. Clark Russell (b. 1844).
H. Rider Haggard (b. 1856).
R. L. Stevenson.
'Edna Lyall.'
'Lucas Malet.'
'Sarah Tytler.'
Mrs Ward.

AMERICAN.

C. Brockden Brown (1771–1810).
Washington Irving (1783–1859).
Fenimore Cooper (1789–1851).
N. Hawthorne (1804–64).
H. P. Willis (1806–67).
W. G. Simms (1806–70).
E. A. Poe (1809–49).
O. W. Holmes (b. 1809).
Mrs Beecher Stowe (b. 1811).
J. G. Holland (1819–81).
Susan Warner (1819–85).
Herman Melville (b. 1819).
Bayard Taylor (1825–78).
Theodore Winthrop (1828–61).
F. R. Stockton (b. 1834).
T. B. Aldrich (b. 1836).
W. D. Howells (b. 1837).
E. P. Roe (1838–88).
Bret Harte (b. 1839).
Henry James (b. 1843).
G. W. Cable (b. 1844).
Eliz. S. Phelps (b. 1844).
Julian Hawthorne (b. 1846).
Frances H. Burnett (b. 1849).
F. Marion Crawford (b. 1854).

November (Lat. *novem*, 'nine') was among the Romans the ninth month of the year (the Ger. *Wind* month) at the time when the year consisted of ten months, and then contained 30 days. It subsequently was made to contain only 29, but Julius Cæsar gave it 31; and in the reign of Augustus the number was restored to 30, which number it has since retained. Its festivals are All Saints (1), St Hubert (3), St Martin (11), St Catharine (25), and St Andrew (30).

Nov'gorod ('new-town'), a famous city of Russia, capital of a government, is situated on the Volkhof, near where it issues from Lake Ilmen, 110 miles SSE. of St Petersburg by rail. It is the cradle of Russian history. In 864, according to tradition, Rurik (a Varangian, apparently a Scandinavian) was invited hither by the neighbouring tribes, and from him begins the history of the country and the line of its sovereigns. As early as the 12th century it had important connection with the Hanse cities, and it became the market of north-east Europe. During the time of its prosperity the town was called Novgorod the Great, and had 400,000 inhabitants, and extended its sway to the White Sea and the river Petchora. Its government was a sort of republic. The greatness of Novgorod provoked the jealousy of the princes of Moscow, and in 1471 the czar Ivan III. nearly destroyed the town, bereft it of its liberties, and exiled the most influential citizens; and when Archangel was opened for English trading-vessels, but especially after the foundation of St Petersburg, its trade fell away, and the town rapidly declined, till now it is but the shadow of its former self. Of the existing ancient buildings the most remarkable are the church of St Sophia, founded

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in the 11th century, and built on the model of St Sophia at Constantinople, possessing some remarkable paintings and tombs; several others of more than thirty churches; and wall surrounding the Kreml. There is a little trade, but hardly any manufactures. Pop. (1885) 20,000.—The *government*, which lies immediately east of that of St Petersburg, has an area of 47,236 sq. m. and a pop. (1885) of 1,213,058. It has some 3000 lakes and many marshes. Three-fifths of this area is covered with forest.

Novi, a town of Italy, 30 miles NW. of Genoa by rail. Pop. 9917. Here in 1799 the French were defeated (15th August) and victorious (6th November).

Novibazar (also *Jenipasar*, sometimes *Rascia*), the capital of a sanjak, situated on the river Rashka, an affluent of the Morava, 120 miles SE. of Bosna Serai. Pop. 12,000. The sanjak of Novibazar (3842 sq. m.; pop. 168,000) is mountainous and barren, but as lying between Servia and Montenegro is of strategic importance. The western part is occupied by Austria; but the civil administration is nominally at least reserved to the Porte.

Novogeorgievsk, a Russian fortress of the first rank, on the Vistula, 20 miles NW. of Warsaw. With Warsaw, Ivangorod, and Brest Litovsk, it constitutes the Polish Quadrilateral.

Novorossisk, a fortified port on the Black Sea, to the SE. of Anapa in Russian Caucasia; the completion of a projected railway to Tzaritzin on the Volga would make it command the Volga trade. A breakwater and quay were begun in 1890. Pop. 2988.

Novotcherkask, a town of southern Russia, capital of the province of the Cossacks of the Don, on the Aksaï, a tributary of the Don, 40 miles from the Sea of Azov, a distance of 12 miles from its right bank, and about 70 miles ENE. of Taganrog. The central administration of the territory was transferred hither from Tcherkask in 1805; but the choice was not a happy one, the distance of the town from the Don, the great commercial artery, being much felt. Drinking-water has since 1867 been brought by an aqueduct 18 miles long. Pop. 37,091, who carry on agriculture, cattle-breeding, fishing, wine-growing, and the making of candles and bricks.

Noyades (Fr., 'drownings'). See CARRIER (JEAN).

Noyau. See LIQUEUR.

Noyes, J. HUMPHREY. See PERFECTIONISTS.

Noyon, a town in the French department of Oise, 67 miles NNE. of Paris by rail. It has a fine cathedral in the Transition style of the 12th century, an hôtel-de-ville (1485–1523), and a former episcopal palace. Pop. 5753. The *Noviodunum* of Cæsar, Noyon was a residence of Charlemagne and Hugo Capet, and the birthplace of Calvin. See Lefranc, *Histoire de Noyon* (Paris, 1888).

Nubia is a comparatively modern name for a large region of Africa, formerly a portion of Ethiopia (q.v.), and extending on both sides of the Nile from Egypt to Abyssinia; touching the Red Sea on the east and the desert on the west. *Nubia Proper*, or *Lower Nubia*, extends from Assouan on the Egyptian frontier to Dongola; beyond that is *Upper Nubia*. But of late the name of *Egyptian Soudan*, properly applicable to a section of Upper Nubia, has come to be used for Nubia in its widest sense, together with the once Egyptian territory actually in the Soudan, and the equatorial provinces (see SOUDAN, also NILE). Under the Pharaohs Nubia was called Cush, but under the twentieth dynasty it was recovered by a series of native rulers, who adopted the civilisation of the Egyptians, and at a later date were Christianised (see ETHIOPIA). At present the country is occupied by races belonging to several different stocks, which have in most places become much mixed in blood. The chief elements are Arab, more or less mixed with Nilotic and Negro blood, mainly in Upper Nubia; Ababdeh and Bisharin between the Nile and the Red Sea; and Nubas and Barabira in Lower Nubia, on and near the Nile between Assouan and Dongola. The Semitic Arabs are comparatively recent intruders to this region. They entered Nubia after occupying Egypt in the 7th century, but were resisted by the Christian Dongolawi kings till the 14th century, when the Arabs, assisted by a large contingent of Bosnians, became masters of the land. Presumably, the aboriginal negro population and tongue have been gradually modified by the admixture of Hamitic and Semitic elements. The various tribes, most of them active and warlike, are Moslems by faith, and till 1820 were ruled by their own chiefs. In that year Ismail Pasha made Nubia an Egyptian territory; and till 1881 it shared the fate of Egypt. For its later history, see EGYPT, SOUDAN. Both in its lower and upper sections Nubia is for the most part an expanse of steppes or rocky desert, with patches where grass sometimes grows, and ravines in which moisture enough is found to keep alive a few mimosas or palms, and to raise pasture for gazelles and camels. There are also wells and small oases here and there, as on the chief caravan routes. The great 'Nubian Desert' lies east of the Nile, opposite the great western bend of the river. Below Khartoum rain is almost unknown; the climate is accordingly excessively hot and dry, and, except in the river-ports after the fall of the Nile, is very healthy. The only exception to the general aridity is the narrow strip of country on both sides of the Nile, which nowhere exceeds four miles in breadth, and in many places is only a quarter of a mile wide. The most fertile part is near Dongola. A mountain barrier bounds the valley on both sides of the Nile, and consists of granite and sandstone.

Nuble, an inland province of Chili. Capital, Chillan (q.v.).

Nucleobranchiata, or HETEROPODS. See GASTEROPODA.

Nucleus. See CELL.

Nudibranchiata. See GASTEROPODA.

Nueva Esparta. See MARGARITA.

Nuevo Leon, a northern state of Mexico, of which Monterey (q.v.) is the capital.

Nuggets. See GOLD, Vol. V. p. 280.

Nuisance, in English legal language, is used to denote whatever causes hurt to one's neighbour, or impedes him in the enjoyment of his property or the exercise of his liberties. A nuisance is either private (e.g. the creation of noxious vapours which make a neighbour's house unhealthy) or public (e.g. the diffusion of noxious vapours in a populous neighbourhood). It is not every slight annoyance that is described in law as a nuisance; there must be some serious interference with the property, health, or comfort of the party who complains. The remedies provided for this form of wrong are various. A court of common law would entertain an action for the recovery of damages; courts of equity went a step further, and granted injunctions forbidding the nuisance to be continued. An injunction may be obtained pending the trial of an action, and it is usual to apply for an injunction in any case where immediate relief is desired. Where the nuisance is injurious to health or life, and where it amounts to obstruction of a right of way, the injured party may abate (remove) the nuisance without resorting to a court of law; but in doing so he must take care not to

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cause unnecessary disturbance or destruction of property. Where the nuisance is public an indictment will lie. If a highway, for instance, is in a dangerous state for want of repair, an indictment lies against the parties who are bound to repair it; but if an individual has suffered special damage, over and above what he suffers as one of the public, he may bring an action. These legal remedies are now reinforced by the extensive powers conferred on local authorities. The acts passed for the removal of nuisances are now consolidated in the Public Health Act, 1875. Sanitary authorities (the guardians in rural districts, and the council or local board in towns) are empowered to appoint inspectors and medical officers, and to take measures for the removal of nuisances. The act contains an elaborate code of rules in regard to sewers, privies, ditches, gas-works, cellars, common lodging-houses, offensive trades, sale of unsound meat, infectious and epidemic diseases, &c. Bylaws may be made by the local authority in regard to these matters; such bylaws require to be confirmed by the Local Government Board. Besides the provisions of the Public Health Act, which are too voluminous to be even summarised within our present limits, there are other acts which empower local authorities to deal with alkali-works, chimneys emitting black smoke, and other forms of nuisance. The Rivers Pollution Act, 1876, was intended to prevent the fouling of streams. Special acts have been passed for the metropolitan district and for the river Thames; and the local acts which have been obtained by town-councils and other public bodies make numerous additions to the already complicated rules of the general law. For the enactments in regard to the suppression of brothels, see PROSTITUTION.

In Scotland the remedies provided in cases of nuisance are substantially the same as in England; and the Public Health Act of 1867 consolidates the statutory powers of local authorities. As to Ireland, see the Public Health Act of 1878. The United States law closely follows the English law; in the legislation of some states the term is used in a narrower sense to denote houses of ill-fame, &c. The powers of municipal authorities are defined by the law of the state to which they belong.

Nukha, a town of Russian Transcaucasia, in Elizabethpol; it is on the southern slope of Caucasus, and 120 miles E. of Tiflis. Pop. 24,994.

Nullification, in the history of the United States, refers especially to the action of the legislature of South Carolina in 1832, declaring certain acts of congress unconstitutional and therefore null and void. In 1828 congress passed what became known as the 'tariff of abominations,' which discriminated unfairly against the people of the southern states. There cotton was the staple product, and any step tending to impose restrictions on the commercial intercourse with Europe, where its principal markets lay, was bitterly opposed; whereas in the north, with its manufacturing interests, a protectionist policy had steadily grown in favour. In 1832 congress readjusted the tariff, modifying some of the objectionable features, but still leaving the southerners unjustly treated. In November a state convention in South Carolina passed an ordinance nullifying the tariff of 1828 and 1832, and declaring their right and intention, in the event of any attempt at coercion, to withdraw from the Union and organise a separate government. In December President Jackson (q.v.) issued a vigorous proclamation against the ordinance, and the governor of South Carolina replied with a counter-proclamation, and volunteers, in addition to the state militia, were organised to resist the national government. But in February 1833 Clay, the 'great pacificator,' introduced a Compromise Bill, providing for the gradual reduction by the year 1842 of all higher duties to 20 per cent.; congress passed this on March 2, and on March 15 the South Carolina convention repealed the ordinance of nullification and secession. See CALHOUN; and for the whole question out of which this movement grew, see STATES' RIGHTS.

Numantia, the chief town of the Celtiberian people called Arevaci, in Hispania Tarraconensis, was situated on a steep hill on the Durius (Douro), in the neighbourhood of the present Soria in Old Castile. The site is probably marked by the present Puente de Guarray. Numantia is celebrated for the heroic resistance which it made to the Romans. After a siege of fifteen months, in the course of which famine and the sword had left alive very few of its 8000 brave defenders, it was taken and destroyed by Scipio the younger, 134 B.C. Scipio's army numbered no fewer than 60,000 men.

Numa Pompilius, in the legendary history of Rome, its second king, the successor of Romulus. He was a native of Cures in the Sabine country, and was universally reverenced for his wisdom and piety. Unanimously elected king by the Roman people, he soon justified by his conduct the wisdom of their choice. After dividing the lands which Romulus had conquered, he proceeded, with the assistance of the nymph Egeria, who gave him interviews in a grove near the city, to draw up religious institutions for his subjects, and thus stands out in the primitive legend as the author of the Roman ceremonial law. His reign lasted for thirty-nine years, and was a golden age of peace and happiness.

Numbers. See PENTATEUCH, BIBLE, APOCALYPTIC NUMBER.

Numbers, THEORY OF, the most subtle and intricate, and at the same time one of the most extensive branches of mathematical analysis. It treats primarily of the forms of numbers, and of the properties at once deducible from these forms; but its principal field is the theory of equations, in as far as equations are soluble in whole numbers or rational fractions, and more particularly that branch known as Indeterminate Equations. Closely allied to this branch are those problems which are usually grouped under the Diophantine Analysis (q.v.), a class of problems alike interesting and difficult; and of which the following are examples: (1) *Find the numbers the sum of whose squares shall be a square number;* a condition satisfied by 5 and 12, 8 and 15, 9 and 40, &c. (2) *Find three square numbers in arithmetical progression;* Answer, 1, 25, and 49; 4, 100, 196, &c.

Forms of Numbers are certain algebraic formulas, which, by assigning to the letters successive numerical values from 0 upwards, are capable of producing all numbers without exception—e.g. by giving to m the successive values 0, 1, 2, 3, &c., in any of the following groups of formulas, $2m$, $2m + 1$; $3m$, $3m + 1$, $3m + 2$; $4m$, $4m + 1$, $4m + 2$, $4m + 3$, we can produce the natural series of numbers. These formulas are based on the self-evident principle that the remainder after division is less than the divisor, and that consequently every number can be represented in the form of the product of two factors + a number less than the smaller factor.

By means of these formulas many properties of numbers can be demonstrated without difficulty. To give a few examples. (1) *The product of two consecutive numbers is divisible by 2:* Let $2m$ be one number, then the other is either $2m + 1$ or $2m - 1$, and the product $2m(2m \pm 1)$ contains 2 as a factor, and is thus divisible by 2. (2) *The product of three consecutive numbers is divisible by 6:* Let

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$3m$ be one of the numbers (as in every triad of consecutive numbers one must be a multiple of 3), then the others are either $3m - 2$, $3m - 1$; $3m - 1$, $3m + 1$; or $3m + 1$, $3m + 2$. In the first and third cases the proposition is manifest, as $(3m - 2)(3m - 1)$ and $(3m + 1)(3m + 2)$ are each divisible by 2, and therefore their product into $3m$ is divisible by 6 (= 1.2.3). In the second case the product is $3m(3m - 1)(3m + 1)$, or $3m(9m^2 - 1)$, where 3 is a factor, and it is necessary to show that $m(9m^2 - 1)$ is divisible by 2: if m be even, the thing is proved; but if odd, then m^2 is odd, $9m^2$ is odd, and $9m^2 - 1$ is even; hence in this case also the proposition is true. It can similarly be proved that the product of four consecutive numbers is divisible by 24 (= 1.2.3.4), of five consecutive numbers by 120 (= 1.2.3.4.5), and so on generally. These propositions form the basis for proof of many properties of numbers, such as that the difference of the squares of any two odd numbers is divisible by 8. The difference between a number and its cube is the product of three consecutive numbers, and is consequently (see above) always divisible by 6. Any prime number which, when divided by 4, leaves a remainder unity, is the sum of two square numbers: thus, $41 = 25 + 16 = 5^2 + 4^2$, $233 = 169 + 64 = 13^2 + 8^2$, &c.

Besides these there are a great many interesting properties of numbers which defy classification; such as that the sum of the odd numbers beginning with unity is a square number (the square of the number of terms added)—i.e. $1 + 3 + 5 = 9 = 3^2$, $1 + 3 + 5 + 7 + 9 = 25 = 5^2$, &c.; and the sum of the cubes of the natural numbers is the square of the sum of the numbers—i.e. $1^3 + 2^3 + 3^3 = 1 + 8 + 27 = 36 = (1 + 2 + 3)^2$, $1^3 + 2^3 + 3^3 + 4^3 = 100 = (1 + 2 + 3 + 4)^2$, &c.

Numbers are divided into *prime* and *composite*—prime numbers being those which contain no factor greater than unity, composite numbers those which are the product of two (not reckoning unity) or more factors. The number of primes is unlimited, and so consequently are the others. The product of any number of consecutive numbers is even, as also are the squares of all even numbers; while the product of two odd numbers, or the squares of odd numbers, are odd. Every composite number can be put under the form of a product of powers of numbers; thus, $144 = 2^4 \times 3^2$, or generally, $n = a^p.b^q.c$, where a, b, and c are prime numbers, and the number of the divisors of such a composite number is equal to the product $(p + 1)(q + 1)(r + 1)$, unity and the number itself being included. In the case of 144 the number of divisors would be $(4 + 1)(2 + 1)$, or 5×3, or 15, which we find by trial to be the case. *Perfect numbers* are those which are equal to the sum of their divisors (the number itself being of course excepted); thus, $6 = 1 + 2 + 3$, $28 = 1 + 2 + 4 + 7 + 14$, and 496 are perfect numbers. *Amicable numbers* are pairs of numbers, either one of the pair being equal to the sum of the divisors of the other; thus, 220 (= 1 + 2 + 4 + 5 + 10 + 11 + 20 + 22 + 44 + 55 + 110 = 284) and 284 (= 1 + 2 + 4 + 71 + 142 = 220) are amicable numbers. For other series of numbers, see FIGURATE NUMBERS.

The most ancient writer on the theory of numbers was Diophantus, who flourished in the 3d century, and the subject received no further development till the time of Vieta and Fermat (q.v.), who greatly extended it. Euler next added his quota, and was followed by Lagrange, Legendre, and Gauss, who in turn successfully applied themselves to the study of numbers, and brought the theory to its present state. Cauchy, Libri, and Gill (in America) have also devoted themselves to it with success.

See Barlow's *Theory of Numbers* (1811); Legendre's *Essai sur la Théorie des Nombres* (3d ed. Paris, 1830); and Gauss's *Disquisitiones Arithmeticæ* (1801; new ed. 1860; Fr. trans. 1807); H. J. S. Smith, in *Brit. Ass. Reports* (1859-65); Cayley, in *Brit. Ass. Reports* (1875).

Numerals. The invention of signs to represent numbers is doubtless much older than any form of writing. But the origin of counting, such as would involve the use of signs, is not so ancient as might be thought; the power of apprehending even comparatively small numbers comes but late in the development from savage to civilised life. Even yet the aborigines of Australia work with only the numbers 1 and 2; 3 being 2 and 1 or 1 and 2; 4 being 2 and 2; and, as a rule, no Australian black can count as high as 7. The earliest visible signs are doubtless the fingers held up; and the denary system of notation is due to the fact that we have ten fingers. The rude method of finger-counting has been developed into a highly-complicated system of reckoning, still in use in eastern Europe by pedlars; various positions and arrangements of the ten digits allowing of reckoning as high as 10,000. For permanent purposes a system of single strokes is the most obvious method; and series of strokes as high as four or five are found in various countries in old inscriptions. But strokes, when numerous, are inconvenient and confusing; hence additional symbols are found to make their appearance for 5, 10, 100, and 1000. In Babylonian inscriptions two Cuneiforms (q.v.) serve to express all the numbers from 1 to 99. The Egyptian scheme is explained and illustrated at HIEROGLYPHICS (Vol. V. p. 707); and from these hieroglyphs were derived the Phœnician, Palmyrene, and Syriac numerals.

After alphabetic writing was in use, the alphabetic signs obviously lent themselves to employment as numerals—either following the order of the letters, each having a successively greater value than its predecessor; or the initial letter of the word for the several numbers might be used. Thus, according to the latter method, the Greek inscriptions used I for 1, Π (Πέντε) for 5, Δ (Δέκα) for 10, H (the old sign for the rough breathing in Ἑκατόν) for 100, X (Χίλιοι) for 1000, and M (Μύριοι) for 10,000. Then a Π with a Δ inscribed in it stood for 50 (5×10), and with H inscribed (5×100) for 500. In this connection the capitals or uncials were used of course. Otherwise, following simply the order of the letters, the twenty-four letters of the Ionic alphabet were used for the numbers 1 to 24; the books of the *Iliad*, for example, are often thus numbered. But a more ingenious method was soon adopted by the Greeks, as also by the Hebrews. The alphabet (cursive) was divided into three groups, of which the first did duty for the units, the second for the tens, the next for hundreds. The Hebrew square character had twenty-two distinct letters, and double forms for five of them, so that three groups, each of nine characters, were available. The Greek alphabet, as ultimately arranged, had twenty-four letters; the three additional signs required to make up three nines were obtained by keeping two of the old Phœnician letters *f* or ϝ (see DIGAMMA) for 6, and 5 or ϟ (koph) for 90, and adding the superfluous sibilant ϡ (sampi) for 900. Then α to θ were 1 to 9; from ι to koph were 10 to 90; ρ to sampi were 100 to 900. The thousands were made by subscribing an ι beneath the units; thus ͵α was 1000; ͵αωθα is 1891. Sometimes a sort of algebraic method was employed for larger numbers; βM = (2 × 10,000) 20,000.

The cumbrous Roman method of using the capitals is familiar enough to ourselves yet. The C has been understood to be the initial of *centum*, and M of *mille*. But some (as Canon Taylor) contend that the Latins, when they dropped the Greek

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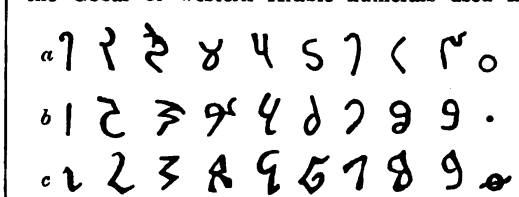
phi, *chi*, and *theta* as phonetic signs, retained them as numerals, with arbitrary values. In this case the C would be originally Θ, assimilated to C, because C was the initial of *centum*. The old ⊕, used for 1000, came to be written CIↃ, afterwards confounded with ↀ or M, the initial of *mille*. The L would be a derivative from an old Chalcidian form of *chi*, inscribed for lapidary purposes ⊥, and then simplified. Those who do not accept the theory of the dropped Greek letters suppose that M is from a circle with a vertical stroke, the C a circle with a horizontal stroke or a cross, ⊕. The X, V, and L might all come from this letter. In any case, X is twice V (whether or not the latter originated in the hand held with the thumb to one side and the other fingers together); and D (for 500) or IↃ is half CIↃ. See the articles in this work on the letters C, D, L, and M.

It is doubtful how far the Abacus (q.v.) has to do with the development of the system of numerals, in which the value of the cipher depends on its position. There were abacus boards so arranged that the first column meant units, the second tens, the third hundreds, the fourth thousands; or, conversely, a method of writing numbers derived from this was actually used in Europe in the middle ages; we show the columnar arrangement simplifying the reading in the several cases, 654, 650, 604, 54.

C	X	I
VI	V	IV
VI	V	
VI		IV
	V	IV

In the decimal scheme of figures as now used by us, the nine numerals with the zero, which enables the value of the position to be secured without abacus or columnar arrangement, are known as the Arabic numerals, but are unquestionably of Indian origin. From India they were apparently brought to Bagdad after the middle of the 8th century, and their value and use was set forth early next century by the Arab mathematician Abu Ja'far Mohammed Ben Musa, or Al-Kharizmi ('native of Khwarizm' —Khiva); whence the system came to be known in Europe, where it became familiar in the 12th century as *Algorism* (erroneously *Algorithm*). The earliest European forms of these characters are found in MSS. of the 12th century; by the 14th they were practically of the same shape as now. The 12th century numerals are evidently forms of the Gobar or western Arabic numerals used in



a, Indian, 10th century; *b*, Gobar, 10th century; *c*, European, 12th century.

Persia in the 10th century. These can be traced to the contemporary Indian Devanagari numerals, which again are as certainly based on an old series of characters used in cave-inscriptions in the 1st and 2d centuries. These Canon Taylor contends are (mainly, at least) degraded forms of the Indo-Bactrian alphabet. See ALPHABET, Vol. I. p. 188. The modern arithmetic was not practised in England till about the middle of the 16th century, and for a long time after its introduction was taught only in the universities.

The decimal system, possessing only nine symbols—viz. 1, 2, 3, 4, 5, 6, 7, 8, 9 (called the nine digits)—adopts the principle of giving to each symbol or 'figure' two values, one the absolute value, and the other a value depending upon its position, a figure moved one place to the left being held to be increased in value ten times. When such a number as 6473 is analysed, it is seen to mean (6 times 1000) + (4 × 100) + (7 × 10) + (3 × 1); and 6004 becomes (6 × 1000) + (4 × 1). In this latter instance the peculiar importance of the figure 0 is seen (see DECIMAL SYSTEM).

It should be mentioned that European nations do not all read the numerals in the same way, as regards larger numbers. Let us take the figures 56,084,763,204,504; these, read after the fashion of the French and other continental arithmeticians, are fifty-six *trillions*, eighty-four *billions*, seven-hundred-and-sixty-three millions, two-hundred-and-four thousands, five-hundred-and-four units; and so also in America. In Britain, instead of billions, we have, according to the current usage, thousands of millions; after this, tens of thousands of millions and hundreds of thousands of millions, and then billions, which are the same as the French trillions. The above number, according to the British mode, would be read fifty-six *billions*, eighty-four-thousand-seven-hundred-and-sixty-three millions, two-hundred-and-four thousands, five-hundred-and-four units. The British trillion has nineteen figures, the continental has thirteen.

As to the Indian origin of our numerals, see Canon Taylor, *The Alphabet* (1883; vol. ii. p. 263-268); Woepke, *Memoire sur la Propagation des Chiffres Indiens* (1863); Burnell, *South Indian Palæography* (1874); Treutlein, *Geschichte unsrer Zahlzeichen* (1875).

Numidia (Gr. *Nomadia*, 'land of Nomads'), the name given by the Romans to a part of the north coast of Africa, corresponding to some extent with the modern Algiers, and lying between Mauritania and the Roman province of Africa; on the south it reached to the chains of Mount Atlas. The inhabitants of Numidia, as of Mauritania, belonged to the race from which the modern Berbers are descended. They were a warlike race, and excelled as horsemen, but were proverbially faithless and unscrupulous. Of their tribes the *Massyli* in the east and the *Massæsyli* in the west were the most powerful. In the grand struggle between the Carthaginians and the Romans they at first fought on the side of the former, but subsequently the king of the Eastern Numidians, Massinissa, joined the Romans, and rendered them effectual service in the war with Hannibal. Favoured by the conquerors, he united all Numidia under his sway. Of his successors in this kingdom Jugurtha and Juba are the most famous. After the victory of Cæsar over Juba I. in the African war Numidia became a Roman province (46 B.C.); but Augustus afterwards gave the western part, with Mauritania, to Juba II., and the name Numidia became limited to the eastern part. Among important places were Hippo Regius, Zama, and Cirta (the residence of the Numidian kings), afterwards called Constantina, a name still preserved in Constantine. For the modern history of Numidia, see ALGIERS.

Numismatics (Gr. *nomisma*, from *nomos*, 'law,' 'a legally current coin') is the science which embraces the study of the current coins of all nations. In the wider, though less accurate, acceptation of the term it includes also that of medals, both artistic and historical. The various branches of numismatics are (1) Greek, Phœnician, &c.; (2) Roman and Byzantine; (3) Mediæval and Modern; and (4) Oriental. The chief value of numismatics consists in the light which coins throw upon history. The secondary importance of the science is purely artistic. The study of coins is also of great use in elucidating the mythology of the ancients, in fixing the chronology of the different systems of alphabetical writing

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(Palæography), and in indicating the origin and gradual extension over the civilised world of the principal systems of weighing the precious metals (Metrology). Historically, coins are of the utmost importance as being contemporary and authentic documents furnishing us with in many cases the only means of ascertaining the names of obscure cities and peoples, together with the chronological succession of their kings, tyrants, or chief-magistrates. Artistically, they faithfully record the successive phases of art from its earliest beginnings to its culminating point, and through all the stages of its decline, subsequent temporary revival, and second decadence, to the present day.

I. *Greek Coins.*—The use of the precious metals as mediums of exchange may be traced back to the remotest ages of which we possess any historical accounts. Thus, for instance, we read that Abraham was 'very rich in cattle, in silver, and in gold' (Gen. xiii. 2; xxiv. 35), and in the account of his purchase of the cave of Machpelah (Gen. xxiii. 16) it is stated that 'Abraham weighed to Ephron four hundred shekels of silver *current with the merchant.*' This use of gold and silver as uncoined money, weighed in the balance, must, however, be carefully distinguished from its use as '*coin*,' a word which implies that the ingot or piece of metal is impressed with an official device, mark, or '*type*,' serving the purpose of a guarantee of just weight and value. 'So far as we have any knowledge,' says Herodotus (i. 94), 'the Lydians were the first nation to introduce the use of gold and silver coin.' The adoption of this apparently simple means of facilitating exchanges appears to have been due in the first instance to the custom of depositing treasure for safe custody in the sacred temples of the gods. Ingots or small lumps of gold or silver, committed to the care of the priests, were consecrated to the local divinity by being impressed with a badge or symbol, usually the head of some sacred animal. These pieces of metal were subsequently put into circulation, the sacred badge being known and accepted in the district as a reliable guarantee of value. The earliest Lydian coins which have been handed down to our times belong probably to the reign of Gyges, who ascended the throne about 700 B.C. They are bean-shaped lumps of the native Lydian gold ore, which contained a large admixture of silver, and went by the name of *electrum* or pale gold. The face or *obverse* of the coin bears the figure of a lion, the sacred symbol of the goddess Cybele, and the *reverse* consists merely of the impress of the rude unengraved punch or nail-head which served to keep the ingot in its place while it was being struck. The ingot, held in position by a pair of tongs, was placed on this square nail-head, and on the top of the ingot the engraved die was laid while the moneyer struck it with successive blows of a heavy sledge-hammer until the impressions of the engraved die on the obverse and of the square nail-head on the reverse were brought into sufficient relief and intaglio respectively.

These one-sided coins with an intaglio or 'incuse' square on the reverse are characteristic of the early stages of the art of coining not only in Lydia, but in all the Greek cities, for the use of coined money rapidly spread from Lydia over all the coasts and islands of the Ægean Sea, each city issuing money bearing the symbol of its local divinity. In Greece proper the earliest coins were of silver, and are said to have been struck by Pheidon, king of Argos. They bear the symbol of a tortoise, a creature sacred to the goddess Aphrodite, in whose temple at Ægina these earliest Greek coins were issued. On this occasion it is related that Pheidon hung up in the temple of the goddess Hera at Argos specimens of the cumbrous bronze and iron bars, *ὀβελίσκοι*, which served the purpose of money before his time, in memory of the old order of things. From the time of Pheidon onwards the coinage of Greece and of the East may be classified historically in the following eight periods:

(i.) 700–480 B.C.—Period of archaic art, ending with the Persian wars.—The art work on the coins of these two centuries is characterised at first by a rude strength of style, and afterwards by a gradual development into clearly-defined forms, which, however, are always distinguishable by their angularity and stiffness from the freer work of later times. Thus, for instance, the eye of the human face is always drawn, even when in profile, as if seen from the front; both corners being visible, while the mouth wears the fixed and formal smile with which we are familiar on the Egyptian monuments. Towards the end of the archaic period a type in relief begins to appear within the incuse square of the reverses. The coins which circulated most widely were, in silver, those of Ægina with the tortoise above referred to; the tetradrachms of Athens, first introduced by Solon 590 B.C., obverse, head of Athena, reverse, owl, the sacred bird of that goddess; and, in gold, the famous Darics, on which the Persian king is represented as a kneeling archer. In the west the chief coins were those of the Greek colonies in Southern Italy, Sybaris, Croton, Tarentum, &c., which differ from those of Greece proper in having the figures on the reverse in intaglio instead of in relief.

(ii.) 480–400 B.C.—Period of transitional and early fine art, to the end of the Athenian supremacy.—The coins of this period are characterised by a great advance in the technical skill with which the dies were engraved. The name of the city or of the chief-magistrate now occurs frequently on the reverse, usually in an abbreviated form.

In Asia Minor the chief coinage of this period is the electrum currency of the flourishing commercial city of Cyzicus on the Propontis, so often alluded to under the name of 'Cyzicene staters' by Xenophon and other historians. In Greece proper the Athenian money was still the chief, though by no means the only medium of exchange, and in the West the Corinthian staters, with the figure of Pegasus on the obverse, had a wide circulation. In Sicily Syracuse affords a larger variety of types than any other Greek city, though the finest specimens of the Syracusan monetary art fall into the next period.

(iii.) 400–336 B.C.—Period of finest art, age of the Spartan and Theban supremacies, and of Philip of Macedon.—The art of die-engraving attained in this period a higher point of excellence than it has ever since reached. The coin-types are remarkable for sculpturesque reserve, intensity of action, or rich and varied ornamentation, according to the requirements of the subject represented. These are most frequently ideal heads of divinities on the obverses, and mythological figures on the reverses, or agonistic types referring to the local games and religious festivals, such as the victorious quadrigæ on the famous Syracusan medallions, which are generally recognised as the finest and most beautifully executed coins that have ever been struck. In this age the practice of coining money had become universal; the number of mints throughout the civilised world was enormous, every little town striking its own 'autonomous' silver or bronze, and, in some cases, gold currency. In European Greece the gold staters of Philip of Macedon obtained a wide circulation, and his conquests in Greece gradually put an end to the independent issues in that country.

(iv.) 336–280 B.C.—Period of later fine art; age of Alexander the Great and the Diadochi, charac-

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terised by the introduction of the portrait of the reigning monarch in place of the head of the divinity on the obverse.—Before Alexander's time no tyrant, however despotic, had ever ventured to place his own head upon the coinage of the state, for hitherto the coinage had continued to maintain intact its original religious character. The regal money of Alexander and his successors now gradually superseded the autonomous coinage of the smaller Greek states, except in the west, which was beyond the sphere of Alexander's conquests, and where the cities of Italy and Sicily continued to strike gold and silver until they were in turn brought under subjection by the growing power of Rome (see below).

(v.–vii.) 280 B.C. to the Christian era.—Periods of early and later decline; age of the Epigoni, the Attalids, and of Mithradates the Great.—The silver and gold coinage during these three centuries is almost exclusively regal, and presents us with a remarkable series of lifelike portraits of the long succession of the Seleucid kings of Syria, of the Ptolemies of Egypt, of the kings of Macedon, of Pontus and Bithynia, of the Attalids of Pergamum, and of the successors of Alexander in Northern India, many of whom are known to us only from their coins. The chief characteristic of the art of numismatic portraiture, which attained its highest perfection about 250 B.C., is its realism, which is carried in some cases almost to the verge of brutality, as for instance on the tetradrachms of some of the kings of Pontus, the ancestors of Mithradates the Great. It is to this period that the earliest coins of the Jews belong—the well-known shekels of Israel, struck at Jerusalem by Simon Maccabæus, 143–135 B.C. Among the latest portraits on Greek coins is that of the famous Cleopatra on a coin of Ascalon. She is represented with wide-open and eager eyes, a prominent and slightly aquiline nose, and a large and expressive mouth, but with none of the seductive beauty which we should expect to find on the coins of this fascinating princess. Among the non-regal coins of the 2d century B.C. the large tetradrachms of some of the Greek cities of the western coast of Asia Minor, which regained their freedom after the defeat of Antiochus the Great by the Romans, 190 B.C., are worthy of note; those of Cyme, Myrina, Smyrna, and Magnesia being especially remarkable. Throughout the greater part of this period Athens continued to coin very plentifully her tetradrachms with the helmeted head of the chryselephantine statue of Athena Parthenos by Phidias on the obverse. These coins formed the chief currency for the trade between Europe and the East.

(viii.) From the Christian era to the reign of the Emperor Gallienus.—During this period of nearly three centuries the Romans permitted the Greek cities in the eastern half of the empire to strike bronze money for local use. It is known to collectors as the 'Greek imperial' coinage. Artistically it is quite without interest, but archæologically it is perhaps more important than the matchless silver and gold currency of the free and independent cities of more ancient times. The Greek imperial coins illustrate the local festivals, religious rites, and municipal institutions which prevailed in the outlying provinces of the Roman empire, and are also of value as recording the names of the successive chief-magistrates and high officials of the various cities, who appear to have been responsible for the coinage in each locality.

II. *Roman and Byzantine Coins.*—The Romans for the first four centuries of their history had no regular coinage, the chief medium of exchange being bronze, circulating by weight, *aes rude*, in lumps of irregular form. It was probably about the middle of the 4th century B.C. that the pound-weight of bronze (12 oz.) was first cast into large unwieldy pieces of circular shape, *aes grave*, having on the obverse a head of Janus, and on the reverse the prow of a galley. This was the Libral As; and its divisions were the Semis (6 oz.), the Triens (4 oz.), the Quadrans (3 oz.), the Sextans (2 oz.), and the Uncia (1 oz.), each of which bore a distinct type and mark of value. As time went on the As was gradually reduced in weight until (*circa* 264 B.C.) it stood at no more than 2 oz. At this point the law stepped in and endeavoured to check the further debasement of the coin by fixing the weight legally at 2 oz. (sextantal reduction), and by issuing for the first time a silver coin, the Denarius, equivalent to ten asses. The fractions of the silver piece were the Quinarius (five asses) and the Sestertius (two and a half asses). In 217 B.C. the weight of the as was further legally reduced to 1 oz. (uncial reduction), and again in 89 B.C. to half an ounce (semuncial reduction). All these successive reductions were financial expedients, the object of which was to bring a little order into the state currency, which continually

Medallion of Syracuse.

tended to become more and more deteriorated. The types of the silver coins, at first constant and uniform, were subsequently varied according to the pleasure of the *triumviri monetales*, as the officers were called who were entrusted with the supervision of the coinage. The long series of the Republican silver money, which extends from 264 B.C. to Imperial times, is now incorrectly known as the Consular or Family series, because the types usually allude to events connected with the family history of the *triumviri monetales*. The Imperial series commenced in 2 B.C., when Augustus abolished the office of the *monetarii* and reserved for himself all rights connected with the coinage of gold and silver, though leaving to the senate the privilege of striking bronze, which was henceforth distinguished by the letters S.C. (*Senatus Consulto*). All coins now bore the portrait of the reigning emperor, or of some member of the imperial family, and on the reverse, for the most part, allegorical personifications, representations of historical events, architectural monuments, or public buildings. Their inscriptions furnish us with the exact date of issue. The chief denominations were, in gold, the aureus; in silver, the denarius; and in bronze, the sestertius (now known as the large bronze), tariffed at four asses; the dupondius (middle bronze), two asses; and the as and its divisions (small bronze). The large bronze from Augustus to Commodus supplies us with a magnificent series of imperial portraits, but from Septimius Severus onwards there is a rapid deterioration both in art and workmanship. From the reign of Caracalla to that of Diocletian the utmost disorder prevailed in the coinage, each successive

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emperor debasing it more and more, until the so-called silver denarius became merely a copper coin washed with tin. In 296 A.D. Diocletian entirely reformed the currency, which was again modified by Constantine, who reduced the weight of the aureus from sixty to seventy-two to the pound. The new gold piece was henceforth known as the Solidus, and it maintained its full weight and purity of metal as long as the empire lasted. This coin received in western Europe the name of Bezant or Byzant, from Byzantium or Constantinople, the capital of the eastern empire. The types of the coins of the Christian emperors retained for a time their pagan character, though little by little Christian symbolism crept in, until at length all pagan influence disappeared, and figures of Christ and the Virgin took the place of the allegorical representations of pagan times. The Latin language in the inscriptions on Byzantine coins continued to be used until the latter part of the 11th century, when it was finally displaced by the Greek.

III. *Mediæval and Modern Coins.*—The coinage of western Europe, down to the time of Charlemagne, consisted mostly of imitations of the Byzantine coins. That emperor (*circa* 768 A.D.) introduced a new silver coin called the *new denier*, which soon came into general use.

English.—The *denier* was introduced into England, under the name of the *penny*, by Offa, king of Mercia (*ob.* 794), previous to whose time the currency of the Anglo-Saxons had consisted of small silver coins (*sceattas*) and copper coins (*stycas*), which were rude copies of the Merovingian money. Under the Anglo-Saxon and early Norman kings local mints were established at all the considerable towns in England, and the penny bore on its reverse both the name of the town and of the moneyer by whom it was struck. The earliest English gold coins were struck by Henry III., but gold money did not come into general use until the reign of Edward III., who introduced the gold *noble* (6s. 8d.) and the gold *florin* (6s.), with their divisions. This king also first struck multiples of the penny, *groats* (4d.) and *half-groats*. Edward IV. added new denominations called the *rose noble* and the *angel*, so called from its type, St Michael slaying the dragon. With the accession of the Tudor dynasty authentic portraits of the reigning sovereign make their first appearance on the coins of the realm, and many new denominations, such as *ryals* or *sovereigns* in gold, and *crowns*, *half-crowns*, *shillings*, &c. in silver, were added. In the time of Charles I. we note a remarkable improvement in the art of die-engraving, of which the celebrated *Oxford crown* is a good example; on the obverse of which is the king on horseback, with a view of the city of Oxford in the distance. In this reign a Frenchman named Briot, employed in the English mint, introduced the use of the mill and screw. On the coins of the Commonwealth the inscriptions are in English instead of Latin, and some of Cromwell's portraits by the famous engraver, Thomas Simon, are worthy of the highest praise. To the series of Charles II. belongs the beautiful *Petition crown*, also by Simon. This coin takes its name from Simon's petition to be reinstated as engraver to the mint, inscribed on the edge: 'Thomas Simon most humbly prays your majesty to compare this, his tryal piece, with the Dutch, and if more truly drawn and embossed, more gracefully ordered, and more accurately engraven, to relieve him.' In Charles II.'s reign the first *guineas* were struck from gold brought from the Guinea Coast, and copper coins, consisting of *halfpennies* and *farthings*, were first regularly established. From this time onwards the English coinage declines very greatly in artistic interest, George IV.'s crown by Pistrucci being perhaps the only modern piece worth noticing.

Scottish.—The coinage of Scotland down to the reign of Robert III. followed closely the English types. From this time original designs became more frequent. It reached its highest point of artistic excellence in the reigns of James V. and Mary; and few modern pieces are more beautiful than the *bonnet-piece* of the former, representing the king wearing a bonnet, and the ryal of the latter, bearing the queen's portrait in profile.

Irish.—The earliest Irish coins were struck by the Danish and Norse invaders, 929–1029. They were copied, as a rule, from the pennies of Ethelred II. After this we have no Irish coinage until the partial conquest of the country by Henry II., in whose reign mints were established at Dublin, Cork, Drogheda, Limerick, Trim, Waterford, and Wexford. Among the more modern Irish coins the gun-metal money of James II. is historically interesting. This was 'money of necessity,' struck after his flight from England. It was decried in the reign of William and Mary, and redeemed only at metal value.

Western Europe.—The mediæval and modern coinage of the various European states, from the time of the issue of the *new denier* by Charlemagne in the 8th century down to the middle of the 17th century, is no less interesting than that of Britain. The Italian and Papal coins are artistically superior to the rest, especially in portraiture, where the influence of the Renaissance of art may be clearly traced. An important landmark in the numismatic history of western Europe is the reintroduction of gold money, dating from the first issue of the *fiorino d'oro* in Florence, 1252. In France the coins of Francis I. and Henry II., and in Germany those of the Emperor Maximilian I., are especially noteworthy; some of the latter being ascribed to the hand of Albert Dürer. Many of the later German *thalers* are also of considerable historical value, as their types record the chief events in the history of the cities by which they were struck.

IV. *Oriental Coins.*—Oriental coins fall into three principal divisions: (i.) The coins of India beginning with those of the successors of Alexander the Great in the 3rd century B.C. in Bactria and the Punjab, and extending down to recent times. The gold and silver coins of the Pathan kings and of the Mogul emperors may be here particularised, more especially the gold *mohurs* and silver *rupees* of Jehangir with the signs of the zodiac engraved in bold relief.

(ii.) The coins of the numerous Arab dynasties in Asia, Africa, and Spain, consist of *dinars* in gold and *dirhems* in silver. The interest of these Mohammedan issues is purely historical, as they bear no representations of living beings, all such images being forbidden to true believers. Many of these coins possess, however, a beauty of their own as specimens of oriental caligraphy. The inscriptions consist of formulæ of the faith from the Koran, together with the name of Calif, the place of mintage, and the date of issue. The Kufic coins are the subject of a special article.

(iii.) The coins of China, Japan, and the far East.—Those of China date from the 7th century B.C., the earliest being in the form of tools, such as adzes, chisels, spades, knives, &c. In the 1st century B.C. these pieces are replaced by circular discs of brass called *cash*, with a square hole in the centre, a form of coin which has survived until quite recent years. The coins of Japan begin about the 7th century A.D., and are modelled on the later Chinese pattern. Among the more modern Japanese issues are oblong pieces of gold and silver, and large oval plates, called *oko-ban*

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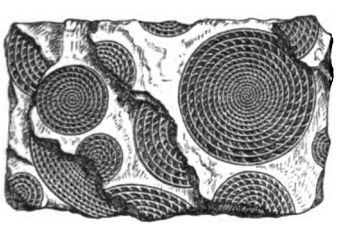
and *ko-ban*, some of which are more than 6 inches in length. Like China, Japan has now adopted a currency modelled on the European pattern.

The standard works on Greek Numismatics in general are Eckhel's *Doctrina Numorum* (1792–98); Mionnet, *Déscription des Médailles grecques* (1807–37); B. V. Head, *Historia Numorum* (Oxford, 1887), and *Guide to the Principal Gold and Silver Coins of the Ancients* (3d ed. 1889); and the *Catalogues of Greek Coins in the British Museum* (1873 *et seq.*). On Roman coins the chief works are Mommsen, *Histoire de la Monnaie romaine* (trans. by Blacas, Paris, 1865–75); E. Babelon, *Monnaies de la République romaine* (1885); and J. Sabatier, *Monnaies byzantines* (1862). On mediæval, modern, and oriental coins there are L. W. Wellenheim, *Catalogue de Monnaies et Médailles* (1845); C. F. Keary, *Coinages of Western Europe* (1879); *Coins and Medals* (ed. by S. Lane-Poole, 1885); J. A. Blanchet, *Numismatique du Moyen Âge et Moderne* (1890); A. Engel and R. Serrure, *Traité de Numismatique du Moyen Âge* (1891); Ruding, *Annals of the Coinage of Great Britain* (1840); Hawkins, *Silver Coins of England* (1887); Kenyon, *Gold Coins of England* (1884); and the *British Museum Catalogues of Oriental Coins*, by S. Lane-Poole and R. S. Poole (1875–90).

Nummulites, or NUMMULINA ('money-fossils'), a genus of fossil foraminifera, the shells of which form immense masses of rock of Eocene age. They are circular bodies of a lenticular shape, varying in magnitude from the merest point to the size of a florin or larger. The shell is composed of a series of small chambers arranged in a concentric manner. The growth of the shell does not take place only around the circumference, but each whorl invests all the preceding whorls, so as to form a new layer over the entire surface of the disc, thus adding to the thickness as well as the breadth, and giving the fossil its lenticular form. A thin intervening space separates each layer from the one which it covers, and this space at the margin swells out to form the chamber. All the internal cavities, however, seem to have been occupied with the living sarcode, and an intimate connection was maintained between them by means of innumerable parallel tubuli, which everywhere pass from one surface to another, and which permitted the passage of the sarcode as freely as do the minute pores or foramina of the living foraminifera. The name is given to them from their resemblance to coins. The genus appears first in the Carboniferous system, where it is represented by one small form. Several species are also met with in Jurassic and Cretaceous rocks, but the genus reached its maximum in Eocene times. It is represented at present by only a few small forms.



Nummulites.

NUMMULITE LIMESTONE, an important member of the Eocene system of southern Europe, &c., consists of a limestone composed of nummulites held together by a matrix formed of the comminuted particles of their shells, and of smaller foraminifera. It attains a thickness of several thousand feet, and has been traced over a vast area. It occurs on both sides of the Mediterranean basin, in Spain and in Morocco. It enters largely into the composition of the Apennines, the Alps, the Carpathians, and the Balkans; it extends through Greece, Egypt, and Asia Minor, and thence through Persia and the Himalayas to the coasts of China and Japan.

Nun (A.S. *nunna;* Low Lat. *nunna* or *nonna*, 'mother;' Gr. *nannē*, *nenna*, 'aunt;' Sansk. *naná*, a familiar word for 'mother,' corresponding to Sansk. *tatá*, 'father'), a member of a religious order of women. The general characteristics of the religious orders will be found under the head MONACHISM (q.v.) and under those of the several orders. Of arrangements peculiar to the religious orders of women the most striking perhaps is the strictness in the regularly authorised orders of nuns taking solemn vows, nuns of the 'cloister,' or enclosure, which no extern is ever permitted to enter, and beyond which the nuns are never permitted to pass, without express leave of the bishop. The superiors of convents of nuns are called by the names Abbess, Prioress, and, in general, Mother Superior. They are, ordinarily speaking, elected by chapters of their own body, with the approval of the bishop, unless the convent be one of the class called exempt houses, which are immediately subject to the authority of the holy see. The ceremony of the solemn blessing or inauguration of the abbess is reserved to the bishop, or to a priest delegated by the bishop. The authority of the abbess over her nuns is very comprehensive, but a precise line is drawn between her powers and those of the priestly office, from which she is strictly debarred. The name of nun is given in general to the sisters of all religious congregations of females who live in retirement and are bound by rule; but it is primitively and properly applicable only to sisters of the religious orders strictly so called. In most cases, soon after the foundation of the orders for men corresponding orders have been established for women. The usages as to diet, fasting, clothing, &c. are very various in the different communities. The veil of reception given to a postulant at the beginning of her novitiate is white; that of profession, given at the end of it, is black in some orders, white in others.

Nunc Dimittis, the name given to the canticle of Simeon (Luke, ii. 29–32), which forms part of the compline office of the Roman Breviary, and is retained in the evening service of the Anglican Church when it follows the second lesson.

Nuncio. See LEGATE.

Nuncomar. See HASTINGS (WARREN).

Nundydroog (*Nandidrúg*), a fortified hill in Mysore, 31 miles N. of Bangalore, and 4810 feet above the sea. The extensive fortifications on the plateau-summit were erected by Hyder Ali and Tippoo Saib, and were stormed by a British force in 1791. The place is now used as a health-resort by Europeans from Bangalore.

Nuneaton, a market-town of Warwickshire, on the river Anker and the Coventry Canal, 14 miles NNW. of Rugby, 9 N. by E. of Coventry, and 22 E. of Birmingham. It has a good Gothic parish church, some remains of a 12th-century nunnery, with a modern church built thereon, and a grammar-school (1553). The ribbon manufacture has given place to worsted, cotton, and woollen spinning. 'George Eliot,' born at Griff, 2 miles to the south, went to school at Nuneaton, and here witnessed the riot described in *Felix Holt*. Pop. of parish (1851) 8133; (1881) 8465.

Nuraghe, or NURHAG, the name of round towers, in shape truncated cones, of which 3000 are scattered about the island of Sardinia. They vary from 20 to 60 feet in diameter, rise 30 or 40 feet above the ground, with two or three stories of domed chambers connected by a spiral staircase, and are made of granite, limestone, basalt, porphyry, sandstone, and schist, built in regular courses of roughly-hewn stone, without cement. Some of the stones in the lower courses weigh 12 tons each. Believed to be of Phœnician origin, they closely

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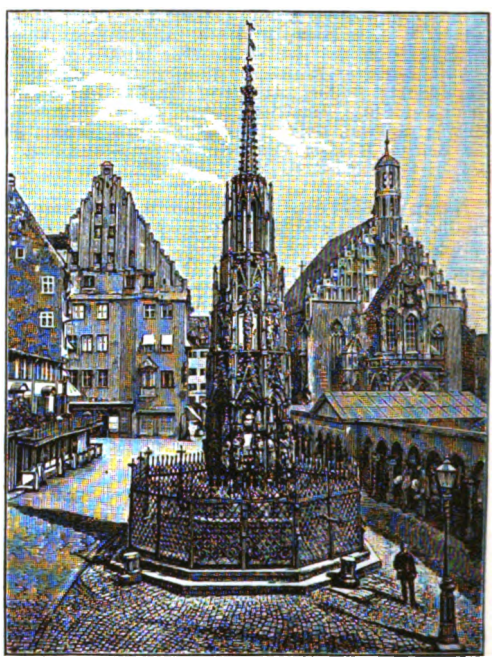
resemble the Brochs (q.v.) of Scotland. Nurhage is regarded by some as an aboriginal word meaning 'fire-circle' or 'hearth;' by some as derived from *Nura*, an old name of Minorca, where such towers (called *talyots*) are common.

See Canon Spano's *Nuraghi di Sardegna* (1867); James Fergusson's *History of Rude Stone Monuments* (1872); and Lieut.-col. Sir R. Lambert-Playfair's *Handbook to the Mediterranean* (1890).

Nur ed-Din Mahmûd, MALEK AL-ADEL, emir and sultan of Syria, was born at Damascus in 1117. His father, Omad ed-Din Zenghi, originally governor of Mosul and Diarbekir under the Seljuk sultans, had established his independence, and extended his authority over northern Syria. Nur ed-Din Mahmûd succeeded him in 1145, and changed the seat of government from Mosul to Aleppo. From this time onwards his life was one long duel with the Christians—the Crusaders, Hospitallers, Templars, and Knights of the Latin Kingdom of Jerusalem. The most notable incidents in this contest may be briefly summarised. Count Joscelin, in an attempt to recover his capital, Edessa, was signally discomfited under its walls, and his army almost annihilated. This gave occasion to the second Crusade. The Crusaders were, however, foiled by Nur ed-Din before Damascus, and, being defeated in a number of conflicts, abandoned their enterprise. The emir next conquered Tripolis and Antioch, the prince of the latter territory being defeated and slain in a bloody conflict in June 1149; and before 1151 all the Christian strongholds in Syria were in Nur ed-Din's hands. He next took possession of Damascus (which till this time had been ruled by an independent Seljuk prince) in 1153. About this time a terrible earthquake devastated Syria, levelling large portions of Antioch, Tripolis, Hamath, Hems, and other towns; and Nur ed-Din devoted all his energies to repairing the damage done. In 1157 the Christian orders suffered a severe defeat near Paneas; but an illness which prostrated their enemy in 1159 enabled them to retake some of their lost territories. Recovering, Nur ed-Din soon won back what had been taken from him, and turned his attention to Egypt, then governed by the effeminate and degenerate Fatimites. In 1168 his brother, Asad al-Din Shirkoh, overran Egypt, but, dying soon afterwards, was succeeded by his nephew, the celebrated Saladin (q.v.), who completed the conquest of the country, and restored the Sunnite faith. This won for Nur ed-Din the gratitude of the calif of Bagdad, who created him sultan of Syria and Egypt. Nur ed-Din, however, grew jealous of his able young lieutenant, and was preparing to march into Egypt in person, when he died at Damascus in May 1173. This prince is one of the great heroes of Moslem history. He was not a savage conqueror, but zealously promoted the cultivation of the sciences, arts, and literature, and established a strict administration of justice throughout his dominions; he was revered by his Moslem, and greatly respected by his Christian, subjects.

Nuremberg (Ger. *Nürnberg*), a city in the Bavarian province of Middle Franconia, in a sandy but well-cultivated district, on the little Pegnitz (a sub-affluent of the Main), 95 miles N. by W. of Munich and 145 ESE. of Frankfort. It is the quaintest and most interesting town of Germany, on account of the wealth of mediæval architecture which it presents in its many-towered walls, its gateways, its picturesque streets with their gabled house-fronts, its bridges, and its beautiful Gothic fountains. The Burg or royal palace, built (*c.* 1024–1158) by Conrad II. and Frederick Barbarossa, commands a glorious view of the surrounding country, and is rich in paintings and wood-carvings; in its courtyard is a coeval linden-tree. Of eight fine churches the two finest are St Lawrence (1274–1477), with two noble towers 233 feet high, exquisite stained glass, the famous stone tabernacle (1495–1500) by Adam Krafft, and the wood-carvings of Veit Stoss; and St Sebald's (*c.* 1225–1377), with the superb shrine of Peter Vischer. Other noteworthy objects are the Italian Renaissance town-hall (1622); the new law-courts (1877); the gymnasium, founded by Melanchthon (1526); the Germanic museum (1852); an industrial museum (1871); a library of 70,000 volumes; Albert Dürer's house; and the statues of him, Hans Sachs, and Melanchthon, with the 'Victoria'



Schönbrunnen Fountain, Nuremberg.

or soldiers' monument (1876). Although the glory of Nuremberg's foreign commerce has long since passed away, the home trade is still of high importance. It includes the specialities of metal, wood, and bone carvings, and children's 'Dutch' toys and dolls, which, known as 'Nuremberg wares,' find a ready sale in every part of Europe, and are largely exported to America and the East. In all there are close on 200 factories, producing also chemicals, ultramarine, type, lead-pencils, beer, &c.; and the town besides does a vast export trade in hops, and import trade in colonial wares from the Netherlands. Pop. (1818) 26,854; (1875) 91,018; (1885) 115,980, of whom 24,213 were Catholics and 3738 Jews.

First heard of in 1050, Nuremberg was raised to the rank of a free imperial city by Frederick II. in 1219. In 1417 the Hohenzollerns sold all their rights to the magistracy. This put an end to the feuds which had hitherto raged between the burggrafs and the municipality; and Nuremberg for a time became the chief home in Germany of the arts and of inventions—watches or 'Nuremberg eggs,' air-guns, globes, &c. Simultaneously it grew rich with the fruits of the great commerce which it maintained between the traders of the East and the other European marts. The discovery of the Cape passage to India deprived it of its monopoly, and the Thirty Years' War completed the decay of the

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city, which a century before had embraced the Reformed doctrines. Still, in 1803 it was allowed to retain its independence, with a territory of 483 sq. m., containing 80,000 inhabitants; but, in consequence of disputes with Prussia, it entered into the Rhenish Confederation, and in 1806 was transferred to Bavaria.

See German works by Voigt (1862), Lachner (4th ed. 1873), Priem (1874), Stockbauer (1879), Roth (1884).

Nursery Rhymes, metrical jingles transmitted in folklore and mechanically repeated by children at their play, without knowledge of their significance or origin. Being in verse form they are easily preserved, either as mere traditional rhymes, or as formulas to be used in games; and, as unconscious survivals of a remote antiquity, they not infrequently preserve for the scientific inquirer fragments of ancient incantations for healing diseases or revealing the future, and invocations combined with ceremonial observances, while the intimate nature of the religious conceptions involved points back unmistakably to a mediæval origin. Children with all their inventiveness and imagination are slaves of the letter, and most of their game-formulas are handed down from generation to generation along with the games themselves. In their characteristic directness, point, and quaintness of phrase, they defy imitation, and in their faculty of arresting the imagination from age to age they reveal the instinct of perpetuity. Many of them are beyond doubt survivals among children of May games, ring-songs and dances, rounds, and kissing games which in old England were played by grown-up people, and these of the higher grades of society. And Mr Newell has proved that many of these are still current in America which are now forgotten in the mother-country, although they not infrequently have equivalents on the continent of Europe.

Under the same general head we include nursery rhymes proper, and counting-out rhymes (to decide who shall begin a game), cumulative rhymes, courting and love games, playing at work, flower oracles, and riddle and guessing games; while on the other hand popular mottoes, old saws and maxims relating to husbandry, the weather, or the like, and all the wealth of local rhymes and sayings belong to the popular rhymes of folklore generally. The verses usually consist either of a rhyming couplet, or of four lines in which the second and fourth rhyme; they are often accompanied by a refrain, which may be a single added line, or may be made up of two lines inserted into the stanza; and in place of exact consonance, any assonance, or similarity of sound, will answer for the rhyme.

See FOLKLORE, PROVERBS, and RIDDLES; also J. O. Halliwell's *Nursery Rhymes of England* (1842; 6th ed. 1860); R. Chambers, *Popular Rhymes of Scotland* (1842); E. Rolland, *Rimes et Jeux de l'Enfance* (Paris, 1883); and especially W. Wells Newell's admirable *Games and Songs of American Children* (New York, 1884), the best work of its class, and a contribution of the first importance to scientific folklore. Appended is a list of sixty-five works bearing on the subject.

Nursing. There are few subjects affecting our social and domestic life in which more interest is taken at the present time than in the nursing of the sick, and there are not many in which time has brought about so great an improvement. Fifty years ago a well-trained and qualified nurse was almost unknown, and, consequently, the care of the sick often devolved upon persons totally unfit for, and ignorant of, the duties required of them. Now there are large numbers of refined and sympathetic women, thoroughly trained in all the different branches of nursing, whose services can be obtained at a moment's notice. It was Miss Nightingale (q.v.) who first awakened the public mind to the need that existed for trained nurses, and who thus opened up, what has proved to be, such a large field for the employment of women taken from all classes of society. Dating from the time of her heroic services in the Crimea, the interest taken in sick-nursing has gone on steadily increasing. As a national recognition of her self-devotion the first training-school for nurses was in 1860 founded in London in connection with St Thomas's Hospital, under the title of the 'Nightingale Fund Training-school for Nurses.' The number of probationer nurses, at first 15, had in 1871 increased to 32; and up to 1889 upwards of 500 trained nurses had been sent out from the school. The different branches of nursing are hospital nursing, private nursing, district nursing, army and navy nursing, and workhouse infirmary nursing. Monthly nursing, massage, and attendance on the insane may be regarded as special developments arising out of ordinary sick-nursing.

For those who desire to make nursing a profession, a thorough hospital training is now absolutely necessary. Hospital training may be had in two ways, either by paying a certain board for a limited period, or by receiving wages and being under agreement to remain in the hospital for a certain term after training. The duties of a hospital nurse are arduous, and can only be successfully performed by those who are possessed of both bodily and mental strength, as well as of a real interest in attending on the sick. Some of the work is simply that of a housemaid, such as dusting the ward and cleansing the utensils. At the Glasgow Western Infirmary, for instance, the probationer is trained in 'the dressing of blisters, burns, sores, wounds, and in applying fomentations, poultices, and minor dressings; in the application of leeches, both externally and internally; in the administration of enemas; in the best method of friction to the body and extremities; in the management of helpless patients—i.e. feeding, moving, changing, their personal cleanliness, preventing and dressing bedsores; in bandaging, making bandages, padding and lining splints; in making the beds of patients, and removing sheets while the patients are in bed; in sick-cookery, such as the making of egg-flip, gruel, &c.' The probationer has usually to wait on the doctor and staff-nurse or sister as well as on the patients, and she must attend the lectures on various medical and surgical subjects that now form part of the training in most hospitals. After training as a probationer in the management of medical and surgical cases, including both day and night work, the usual course is to become ward- or staff-nurse, or to leave the hospital for the special kind of nursing which is intended to be followed. A certificate is usually given at the close of the period of training. The age at which probationers enter the adult hospitals is from twenty-five to thirty-five, and from twenty to thirty at the children's hospitals. The salaries are usually £10 the first year, £15 the second, £20 the third. Uniform is provided in addition, and a certain amount of washing allowed for. Sisters or head-nurses receive from £30 to £60, matrons from £100 to £250. It is often necessary to wait for months before getting into any of the large hospitals, as there are always many more applications than vacancies. At the Edinburgh Royal Infirmary there are usually over 500 applications yearly for the 25 vacancies. The principal training-schools in London are London Hospital, St Bartholomew's, St Thomas's, Guy's, and St Mary's; in Scotland, the Edinburgh Royal Infirmary and Glasgow Western Infirmary; in Ireland, the principal hospitals in which training may be obtained are Sir Patrick Dun's, Adelaide, and Meath in Dublin, and the Royal Hospital in Belfast.

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Probationers are also trained at the Hospital for Sick Children, Great Ormond Street, W.C.; Manchester General Hospital and Dispensary for Sick Children, Pendlebury; and Royal Hospital for Sick Children, Edinburgh. Application should be made in writing to the matron of any of these hospitals. Many of the Irish hospitals, such as the Mater Misericordiæ in Dublin—the largest and finest hospital in Ireland—are nursed by Sisters of Mercy.

Private nursing is in some respects both more difficult and more trying than hospital nursing. The responsibility is greater as the doctor is not always at hand, and the nurse has sometimes to attend to her patient both night and day. The pay is usually from 1½ to 3 guineas per week.

Queen Victoria, taking great interest in district nursing, devoted the surplus of the Women's Jubilee Offering, amounting to £70,000, to the foundation of a systematic scheme for the training and support of district nurses, to which was given the name of Queen Victoria's Jubilee Institute for Nurses. The interest of this sum, about £2000, is employed in the maintenance of central institutions, where nurses are trained for this special work. There are at present four of these centres, in London, Edinburgh, Dublin, and Cardiff. Nurses who have gone through the required training at any of these Homes are eligible to be entered on the roll of the Queen's Institute, and are entitled to wear the badge as Queen's nurse. The special teaching required, after a year of hospital work, consists of six months' approved training in a central district home, and, for country members, three months' approved training in midwifery. The scheme, started in 1887, has already made great progress, and in different divisions of the United Kingdom many branches are now working with much acceptance. This system offers a rapidly extending field of usefulness to those who wish to follow the profession of nursing, and there is an increasing demand for candidates to fill the growing number of vacancies created by the spread of the movement.

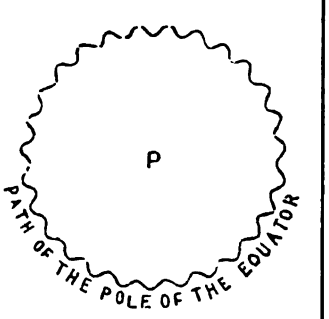
The army and navy nurses must all be ladies of good social position, and require to undergo three years' training in a general hospital. They are called Her Majesty's Nursing Sisters, and may be ordered on active service in any war. As a reward for special service they receive the order of the Royal Red Cross. It is only of late years that trained nurses have been employed in our workhouse infirmaries, but it is now becoming quite common to find them there. There is a great demand for trained nurses to go abroad. The Royal National Pension Fund for nurses was established in 1887, and promises to be of signal service in providing for those who spend themselves in the struggle against disease and death.

Most of the large hospitals in the British colonies follow the example of the mother-country in regard to nursing arrangements. In America the practice of nursing is very thoroughly taught in many of the hospitals, particularly those in the north-eastern states, such as the Bellevue Hospital in New York, the Long Island Hospital in Brooklyn, the Philadelphia and Pennsylvania Hospitals in Philadelphia, and the Massachusetts General Hospital in Boston. On the continent of Europe the employment of male nurses to attend male patients is common, and in the Roman Catholic countries the nursing of the hospitals is for the most part in the hands of Sisters of Mercy. In Germany a great impetus was given to improvements in nursing by the interest shown in the matter by the late Empress Augusta, the Empress Frederick, and the late Princess Alice of Hesse. The training of nurses on the lines adopted in Britain was instituted in Paris during 1877, by the establishment of l'École de Garde-malades et d'Ambulancières.

See Miss Nightingale's *Notes on Nursing* (1860; 2d ed. 1876); Dr J. W. Anderson, *Medical Nursing* (1883); *Handbook of Nursing* (Phila. 1879); S. Weir Mitchell, *Nurse and Patient* (Phila. 1877); Eva C. E. Lückes, *Lectures on General Nursing* (1884), and *Hospital Sisters and their Duties* (1886); Dr C. J. Cullingworth, *Manual of Nursing, Medical and Surgical* (1883; 2d ed. 1885); J. C. Wilson, *Fever Nursing* (Phila. 1888); E. T. Bruen, *Outlines for the Management of Diet* (Phila. 1888); and for much useful information, Burdett's *Hospital Annual*.

Nut, in popular language, is the name given to all those fruits which have the seed enclosed in a bony, woody, or leathery pericarp, not opening when ripe. Amongst the best-known and most valuable nuts are the Hazel-nut, Brazil-nut, Walnut, Chestnut, and Cocoa-nut, all of which are edible. Other nuts are used in medicine and for purposes connected with the arts. Some of the edible nuts abound in a bland oil, which is used for various purposes.—In Botany the term nut (*nux*) is used to designate a one-celled fruit, with a hardened pericarp, containing, when mature, only one seed. The Achene (q.v.) was by the older botanists generally included in this term. Some of the fruits to which it is popularly applied scarcely deserve to be so called. The hazel-nut is an excellent example of the true nut of botanists.—The name nut, without distinctive prefix, is popularly given in Britain to the hazel-nut, but in many parts of Europe to the walnut. Many nuts have a considerable commercial value, from their being favourite articles of food: these are the Hazel-nut and its varieties, the Black Spanish, the Barcelona, the Smyrna, the Jerusalem filbert, and the common filbert; the Walnut, Chestnut, Hickory, and Pecan; the Souari, the Cocoa or Coker nuts, and the Brazil or Para nut. For the Pea-nut, see GROUND-NUT.

Nutation is a slight oscillatory movement of the earth's axis which disturbs the otherwise circular path described by the pole of the earth round that of the ecliptic, known as the 'precession of the equinoxes.' It is produced by the same causes —viz. the attraction of the sun, moon, and planets (the attraction of the last mentioned being so small as to be quite imperceptible) upon the bulging zone about the earth's equator, though in this case it is the moon alone that is the effective agent. It also, for reasons which need not be given here, depends, for the most part, not upon the position of the moon in her orbit, but of the moon's node. If there was no precession of the equinoxes nutation would appear as a small elliptical motion of the earth's axis performed in the same time as the moon's nodes take to complete a revolution, the axes of the ellipse being respectively 18″·5 and 13″·7, the longer axes being directed towards the pole of the ecliptic. But this motion, when combined with the more rapid one of precession, causes the pole of the earth's axis to describe a wavy line round P, the pole of the ecliptic.



The effect of nutation, when referred to the equator and ecliptic, is to produce a periodical change in the obliquity of the ecliptic and in the velocity of retrogradation of the equinoctial points.

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It thus gives rise to the distinction of 'apparent' from 'mean' right ascension and declination, the former involving and the latter being freed from the fluctuations arising from nutation.

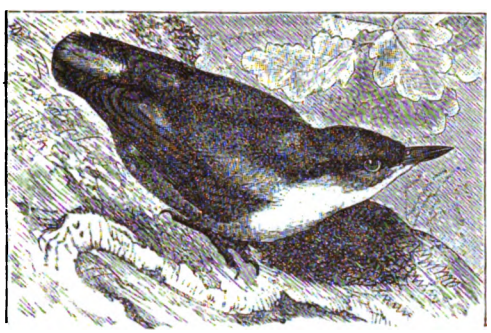
Nut-cracker (*Nucifraga*), a genus of birds of the family Corvidæ, with a straight, stout, conical bill, both mandibles terminating in an obtuse point, and tail nearly square at the end. Four species are known, ranging from northern Europe and Arctic Siberia to the Himalayas and China. One species (*N. caryocatactes*) is occasionally seen in Britain and is not uncommon in many parts of Europe and of Asia, particularly in mountainous regions covered with pines. It is about 12 inches long. The plumage is light brown, speckled with white, except on the wings, rump, and tail, which are nearly black. The female shows a somewhat redder brown colour on the wing-feathers. The nut-cracker frequents the tops of the high pine-trees, its favourite food being the seeds of the pine cones, which it extracts, holding the cone in its foot. Its diet, however, is often very varied. Its nest is built of sticks, roots, and grass, and lined with moss or lichens, on the bough of a tree near the

Nut-cracker (*Nucifraga caryocatactes*).

stem and at some distance from the ground.—A closely allied species (*N. multipunctata*) is found in Cashmere, and a larger species (*N. hemispila*), with browner plumage, in the Himalayas.

Nut-galls. See GALLS, GALL-FLY.

Nut-hatch (*Sitta*), a genus of birds of the family Sittidæ, having a straight conical or prismatic bill, short stout legs, the hind-toe very strong, and large hooked claws. They run up and down trees with great agility, moving with equal ease in either direction, and without hopping, so that the motion is rather like that of a mouse than of a bird. They feed on insects, in pursuit of which they examine the crevices and remove large pieces of the bark; at other times on seeds, as those of pines, and the kernels of nuts, to obtain which they fix the nut in some crevice and then hammer it with their bill until the shell is broken, each blow being delivered with the whole strength of the body working from the hip-joint; hence the name of Nut-hatch or Nut-hack. Seventeen species are known, ranging south in the Old World to Southern India and Burma, and in the New World to Mexico, being well represented in North America. One species (*S. cæsia*) is fairly common in many districts of England containing old timber. It occurs in the south of Scotland, and has been reported as seen in Skye and in the Shetlands; but as yet it is unknown in Ireland. It extends through central and southern Europe to Persia and even south-eastern Siberia. Its whole length is about 5¼ inches. The upper parts are generally of a blue slate colour; the wing-quills grayish brown; the middle tail-feathers more slate-gray, the remainder black at their bases and barred and



Nut-hatch (*Sitta cæsia*).

tipped with white and gray; a black band runs from the base of the bill through the eye to the nape of the neck; the throat and under parts are of a pale cinnamon or rich buff colour; the bill, legs, and feet are brown. The plumage of the female is somewhat duller. Its nest is made of dry leaves or scales of cones, generally in the hole of a tree. From five to seven eggs are laid, of a white colour spotted with reddish brown.—A closely allied species (*S. europæa*), with nearly white under parts, is found in the Danish Islands and throughout northern Europe and northern Asia as far as Japan. The nut-hatch is absent from Malta and Sardinia, but in Corsica a distinct species (*S. whiteheadi*) is found, the under parts being white and the head jet-black in the male. The nut-hatches of Australia and New Guinea belong to a distinct though closely allied genus, Sitella. The Blue Nut-hatches (genus Dendrophila) are found from Ceylon and India to Burma and Malaya. The Coral-billed Nut-hatch, the only species of another genus (Hypherpes), is found only in Madagascar.

Nutmeg. This well-known and favourite spice is the kernel—mostly consisting of the albumen—of the fruit of several species of Myristica. This genus belongs to a natural order of exogens called Myristicaceæ, which contains about forty species, all tropical trees or shrubs, natives of Asia, Madagascar, and America. They generally have red juice, or a juice which becomes red on exposure to air. The leaves are alternate and without stipules. The flowers are unisexual, the perianth generally trifid, the filaments united into a column. The fruit is succulent, yet opens like a capsule by two valves. The seed is nut-like, covered with a laciniated fleshy aril, the albumen penetrated by its membranous covering. All the species are more or less aromatic in all their parts; their juice is styptic and somewhat acrid; the albumen and aril contain both a fixed and an essential oil, and those of some species are used as spices. The species which furnishes the greater part of the nutmegs of commerce is *M. fragrans;* but the long nutmeg (*M. fatua*), from the Banda Isles, is now not uncommon in our markets. The common nutmeg-tree is about 25 feet in height, with oblong leaves and axillary few-flowered racemes; the fruit is of the size and appearance of a roundish pear, golden yellow in colour when ripe. The fleshy part of the fruit is rather hard, and is of a peculiar consistence, resembling candied fruit; it is often preserved and eaten as a sweetmeat. Within is the nut enveloped in the curious yellowish-red aril, the *Mace* (q.v.), under which is a thin shining brown shell, slightly grooved by the pressure of the mace, and within is the kernel or nutmeg. Up to

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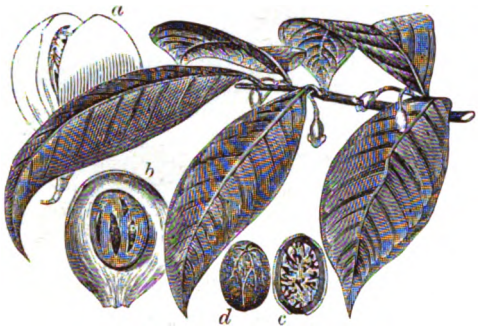
1796 the Dutch, being the possessors of the Banda Isles, jealously prevented the nutmeg from being transplanted; but during the British occupation plants were sent to Penang, India, the West Indies, Brazil, Réunion, where they are now successfully



Nutmeg (*Myristica fragrans*):
a, fruit bursting open; *b*, the same with one valve removed, showing the seed; *c*, section of seed; *d*, seed with the testa removed (Bently & Trimen).

cultivated. Nutmegs are very liable to the attack of a beetle, which is very destructive, and it is a common practice to give them a coating of lime before shipping them to Europe to kill the vitality of the germ. The nutmeg yields by expression a peculiar yellow fat, called oil of mace, because from its colour and flavour it was generally supposed to be derived from mace; and by distillation is obtained an almost colourless essential oil which has very fully the flavour of the nutmeg. Nutmegs are chiefly used as a spice, but medicinally they are stimulant and carminative. They possess narcotic properties, and in large doses produce stupefaction and delirium. Great Britain imports from 300,000 to 700,000 lb. annually, besides mace to the extent of 60,000 to 80,000 lb. The culture of nutmeg is somewhat peculiar. The plantations are always made from seed, and the plants do not produce flowers till they are eight or nine years old. The sexes being on different trees, when the plants are two years old the greater number composing a plantation are headed down and grafted with scions taken from the female tree, a few only being grafted with scions of the male to ensure fecundation. Other species of Myristica besides those already named yield nutmegs sometimes used, but of very inferior quality. The fruits of several species of Lauracea also resemble nutmegs in their aromatic and other properties, as the cotyledons of *Nectandra puchury*, the Pichurim Beans of commerce, and the fruit of *Acrodiclidium camara*, a tree of Guiana, the Camara or Ackawai nutmeg. The clove nutmegs of Madagascar are the fruit of *Agathophyllum aromaticum*, and the Brazilian nutmegs of *Cryptocarya moschata*. All these belong to the order Lauraceæ. The Calabash Nutmeg is the fruit of *Monodora myristica*, of the natural order Anonaceæ.

Nutria. See COYPU, FURS.

Nutrition. See the articles on BLOOD, CIRCULATION, DIET, DIGESTION.

Nux Vomica is the name given to the seed of *Strychnos Nux Vomica*. The seeds are imported from the East Indies, and are flattish and circular, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray colour, thickly covered with short satiny hairs, internally translucent, tough and horny, taste intensely bitter, inodorous. The tree is a native of Coromandel, Ceylon, and other parts of the East Indies. It is a tree of moderate size, with roundish-oblong, stalked, smooth leaves, and terminal corymbs. The fruit is a globular berry, about as large as a small orange, one-celled, with a brittle shell, and several seeds lodged in a white gelatinous pulp.—The bark is sometimes known as *False Angostura Bark*, having been confounded with Angostura Bark, which is non-poisonous, and simply has the action of a bitter. The seeds contain (in addition to inert matters, such as gum,

Nux Vomica (*Strychnos Nux Vomica*) Branch with Flowers:
a, fruit; *b*, section of fruit (Bently & Trimen).

starch, woody fibre, &c.) two alkaloids closely related to each other, which act as powerful poisons on the animal frame, and speedily occasion violent tetanic convulsions and death. These alkaloids are named *Strychnine* and *Brucin*, and exist in the seeds in combination with lactic and strychnic (or igasuric) acids. For a method of obtaining strychnine from the seeds, see the *British Pharmacopœia*; and for the poisons, see BRUCIN and STRYCHNINE.

Nyam-Nyams. See NIAM-NIAM.

Nyangwe, an Arab trading station on the Upper Congo or Lualaba, at the edge of the Manyema country, in 4° 20′ S. lat. From that point Stanley commenced the descent of the Lualaba in 1876.

Nyanza. See ALBERT NYANZA, VICTORIA NYANZA, MUTA NZIGE.

Nyassa, or NYANJA, the southernmost of the equatorial great lakes of East Africa, is situated about 260 miles SE. of Tanganyika and 400 inland from the east coast. It lies at an altitude of 1570 feet, is very deep in the middle, shelving rapidly from the shores, which are rocky and high. Long and narrow, it measures 350 miles from north to south and an average of 40 from east to west. The river Shiré emerges at its southern extremity, and goes south to the Zambesi. The waters of the lake are sweet and abound in edible fish. Although the Portuguese had knowledge of the existence of the lake under the name of Maravi early in the 17th century, Livingstone was the first to fix in 1859 its exact situation and to navigate it.

NYASSALAND, a name applied to the regions immediately south, west, and north-west of Lake Nyassa, but without conveying any precise limitation of boundaries, practically means the region in which the African Lakes Company of Glasgow has carried on its operations since its foundation in

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1878; it works hand in hand with the missionaries of the Established and the Free Church of Scotland, whose principal stations are at Blantyre, some distance to the south of the lake, and Bandawe, half-way up its western side. Both the commercial company and the mission stations were founded in response to representations by Dr Livingstone, for the express purpose of counteracting the slave-dealings of the Arab marauders, and they have had much trouble owing to the hostility of these people. Some trouble too has been occasioned of late years by Portugal, who claimed to exercise sovereignty over the region. See ZAMBESIA.

Nyâya, the second of the great systems of ancient Hindu philosophy. See SANSKRIT LITERATURE.

Nyborg. See FÜNEN.

Nyctaginaceæ, a natural order of plants, consisting partly of herbaceous plants, both annual and perennial, and partly of shrubs and trees. There are about 100 known species, natives of warm countries. Some have flowers of considerable beauty, as those of the genus Mirabilis, known in our gardens as *Marvel of Peru*, one of which, *M. Jalapa*, was at one time erroneously supposed to produce jalap. The roots of many are fleshy, purgative, and emetic.

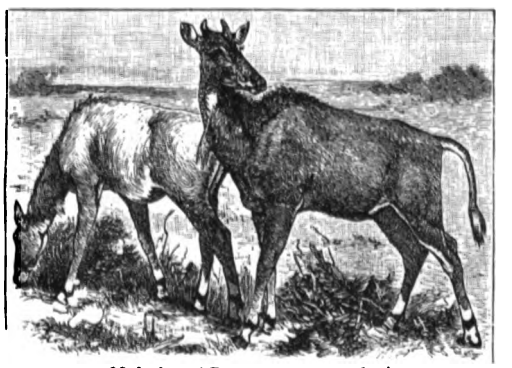
Nyctalopia (Gr. *nyx*, 'night;' *ōps*, 'the eye'), the defective vision of persons who can see in a faint light but not in bright daylight; sometimes applied to the opposite defect, inability to see save in a strong daylight.

Nycteribia, very remarkable, wingless, spider-like, Dipterous insects, parasitic on bats.

Nykerk, or NIEUWKERK, a small town in the Dutch province of Gelderland, 28 miles SE. of Amsterdam by rail, and 1¼ mile from the Zuider Zee. Pop. 7599.

Nyköping, a seaport of Sweden, situated on a bay of the Baltic, 62 miles SW. of Stockholm (100 miles by rail), manufactures machinery and cotton. The castle, now ruined, ranked in point of strength next to those of Stockholm and Calmar. King Waldemar was imprisoned here after his dethronement in 1288, till his death in 1302. Eric and Waldemar, brothers of King Birger, were left in 1317 to perish of hunger in a dungeon, the keys of which the king threw into the sea. In horror of this deed the people seized the castle and demolished it. In 1719 the town was taken and dismantled by the Russians. Pop. (1885) 5374.

Nyl-ghau (*Portax tragocamelus*), a species of antelope, with somewhat ox-like head and body, but with long slender limbs, and of great activity and fleetness. It is one of the largest of antelopes, and is more than four feet high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forwards. The female has no horns. The neck is deep and compressed, not rounded as in most of the antelopes. A slight mane runs along the neck and part of the back, and the breast is adorned with a long hanging tuft of hair. The back is almost elevated into a hump between the shoulders. The nyl-ghau inhabits the dense forests of India and Persia, where it has long been regarded as one of the noblest kinds of game. The name is Persian, and signifies 'blue ox.' It is often taken, like other large animals, by the enclosing of a large space with nets, and by great numbers of people. It is a



Nyl-ghau (*Portax tragocamelus*).

spirited animal, and dangerous to a rash assailant. It is capable of domestication, but it is said to manifest an irritable and capricious temper.

Nymphæaceæ, a natural order of exogenous plants, growing in lakes, ponds, ditches, and slow rivers, where their fleshy root-stocks are prostrate in the mud at the bottom; and their large, long-stalked, heart-shaped, or peltate leaves float on the surface of the water. Their flowers also either float or are raised on their stalks a little above the water. The flowers are large, and often very beautiful and fragrant. There are usually four sepals, and numerous petals and stamens, often passing gradually into one another. The ovary is many-celled, with radiating stigmas, and very numerous ovules, and is more or less surrounded by a large fleshy disc. The seeds have a farinaceous albumen. More than fifty species are known, mostly natives of warm and temperate regions. The root-stocks of some of them are used as food, and the seeds of many. See WATER-LILY, LOTUS, VICTORIA, and EURYALE.—Very nearly allied to Nymphæaceæ are Nelumbiaceæ. See NELUMBO.

Nymphs, in Greek Mythology, female divinities of inferior rank, inhabiting the sea, streams, groves, meadows and pastures, grottoes, fountains, hills, glens, and trees. Among them different classes were distinguished, particularly the *Oceanides*, daughters of Oceanus (nymphs of the great ocean which flows around the earth), the *Nereids*, daughters of Nereus (nymphs of the inner depths of the sea, or of the Inner Sea—the Mediterranean), *Potameides* (River nymphs), *Naiads* (nymphs of fountains, lakes, brooks, wells), *Oréads* (Mountain nymphs), *Napææ* (nymphs of glens), and *Dryads* or *Hamadryads* (Forest nymphs, who were believed to die with the trees in which they dwelt). They were the goddesses of the fertilising power of moisture, possessed prophetic power, and took interest in the nourishment and growth of infants, the chase, and dancing. They are among the most beautiful conceptions of the plastic fancy of the ancient Greeks. See Krause, *Die Musen, Grazien, Horen und Nymphen* (Halle, 1871).—For Nymph in natural history, see CHRYSALIS.

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O

O the fifteenth letter of our alphabet, is the only letter which cannot be traced to the Egyptian hieroglyphics. It is believed to have been an ideographic picture invented by the Semites to express a sound only found in Semitic languages. This supposition is supported by the correspondence of its Semitic name *'ayin*, which means an 'eye,' with its oldest form ○, which may be regarded as the picture of an eye. The sound of *'ayin* was a faucal breath, resembling the *h* in *huge*. The Greeks, who took over the Phœnician alphabet, having no corresponding sound in their language, used the symbol for the vowels *ŏ*, *ou*, and *ō*, which they required. In the earliest Greek inscriptions O represents all three sounds. About 550 B.C. the symbol was differentiated, the closed form o, called *omicron*, or 'little *o*,' being appropriated for the short *ŏ*, while it was opened out at the bottom, Ω, to represent the long *ō*, which was called *omega* or 'great *o*.' In the Italic alphabets, which were obtained from Greece before the invention of *omega*, only the first of these symbols appears, whereas in the Runes, which were obtained at a somewhat later date, the vowel *o* is expressed by a symbol derived from *omega*. In our English alphabet this letter has been more stable than any other. Its form is the same as that found on the Moabite stone, and its value agrees with its value in Greek and Latin, while it is the only English vowel which normally possesses the same sound which it has in French, German, and other modern continental languages. The sound is intermediate between *a* and *u*, and may arise out of either—i.e. it may represent an Anglo-Saxon *a* or *u* as well as an Anglo-Saxon *o*. In English it has three values: the name-sound heard in *note*, which is the original sound, the shorter sound heard in *not*, and the neutral vowel heard in *son*. In English the name-sound may be represented in ten ways, as in the words pole, *goat*, *toe*, *yeoman*, *sow*, *sew*, *hautboy*, *beau*, *owe*, and *though*.

Oahu. See HAWAII.

Oaja'ca, a mountainous state in the south of Mexico (q.v.), bordering on the Pacific. The capital, Oajaca, lies 5060 feet above the sea, in the fertile valley of the Atoyac. It contains a large cathedral (1729), a quaint bishop's palace, the Seminario Tridentino, and the State Institute, with thirty-four professors. The manufactures are chiefly chocolate, cotton goods, cigars, candles, and soap. Pop. (1887) 27,856.

Oak (*Quercus*), a genus of trees and shrubs of the natural order Cupuliferæ, having monœcious flowers, the male in slender catkins or spikes, the female solitary or clustered; the fruit a nut or acorn, oblong, ovoid, or globular, protruding from a woody cup formed by the enlarged scales of the involucre; the leaves are deciduous or evergreen, alternate, entire, lobed, or sinuate. The species, of which there are about 300, are spread over nearly the whole of the northern hemisphere, except the extreme north. They are more numerous in America than in Europe; a few are found in Asia, none in tropical Africa, in Australia, or in South America except about the Andes. The Common or English Oak (*Q. robur*) is the most widely distributed of the species. It extends all over Europe, except the extreme north, and penetrates into central Asia by way of the Caucasus. In Britain there are two well-marked 'races,' which in their more extreme forms have been designated and described by some authorities as species, while by others they are, and with better reason, regarded merely as distinct seminal varieties of *Q. robur*.

Fig. 1.—Common Oak (*Quercus robur pedunculata*): *a*, branch in fruit; *b*, male flower; *c*, female flower.

The form that is most common—*Q. r. pedunculata*—is characterised by having stalkless or nearly stalkless leaves, while the acorns are borne on more or less elongated stalks. The other form—*Q. r. sessiliflora*—has these features inverted; the leaves are stalked and the acorns stalkless. The former is found most plentifully in the south and midland counties of England, the latter in the west and north, and in Scotland. But though these peculiarities of structure and geographical distribution are more or less true and constant, the two forms are not only found growing together in all districts, but the extremes of structural difference are also linked together by individual trees which exhibit every intermediate gradation of structural disparity. The Durmast Oak (*Q. r. sessiliflora pubescens*), which is most abundant in the New Forest, Hampshire, differs only from the stalkless fruited variety in having the leaves more or less downy on the under side, and in retaining them longer in winter than either of the others. But this variety is also found in company with the others in different parts of the country.

Prior to the introduction of iron into shipbuilding, when 'hearts of oak were our ships,' the comparative merits of the timber of these several forms of oak were vigorously discussed both in Britain and in France, but with so much contradictoriness of assertion that sound conclusions could not be deduced. So much is the quality of oak timber

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affected by the soil and other circumstances in which the trees grow, that it is not improbable that the advocates on either side may have unwittingly confounded the wood of one variety with that of the other. The strength and durability of the timber of either kind is as unquestionable as is the extreme longevity of the trees. The timber of no other European tree combines in itself the essential elements of strength and durability, hardness and elasticity, in the same degree as the oak. Longevity is a characteristic of all species of oak, but the British oak is celebrated above all others for the great age to which it attains. In many districts of England, and in a few also of Scotland, there exist huge venerable living remains of giant oaks, whose age cannot be computed with accuracy, but which, when compared with younger trees authentically known to be 300 or 400 years old, may, without improbability, be reckoned to have stood for more than 1000 years. Many of these ancient trees are historical landmarks, being associated with the events and the names of persons of the remote past. Legendary though some of these associations may appear to be when applied to such as the 'King Oak,' in Windsor Forest, which is said to have afforded shade and shelter to William the Conqueror, it is far from improbable that the tree may have been of considerable age at the time of the Conquest. The circumference of the trunk of this tree in 1864, at 3 feet from the ground, was 26 feet. But there are many larger living oaks in other parts of the country. The Cowthorpe Oak, for instance, in the village of that name, 6 miles SE. of Knaresborough, measured, at 3 feet from the ground, 48 feet in circumference. This tree is simply a wreck of former grandeur, yet lives and puts forth leaves annually. Taking the less favourable character of the climate of the West Riding of Yorkshire, when compared with that of Windsor Forest, into account along with the immensely greater bulk of the Cowthorpe Oak than the King Oak, it is not extravagant to assume that the former may be twice the age of the latter. The oak from remotest antiquity has had a celebrity among trees; it has been regarded as the 'Monarch of the Forest.' It was held sacred by the Greeks and Romans and by the ancient Gauls and Britons. The history of the use of the timber of the oak as material for shipbuilding may be said to date from the time of King Alfred (see NAVY). The timber is also employed in architecture, cabinet-making, carving, mill-work, and coopering; and the sawdust was formerly employed in the dyeing of fustian.

Fig. 2.—Sessile-fruited Oak (*Quercus robur sessiliflora*) Branch in Fruit.

The bark is of great value as furnishing tan for the use of the tanner. It yields a bitter extract named *Quercine*, which is employed in medicine as a tonic and astringent. Colouring matter is also obtained from it, which is used in dyeing wool. The acorns are excellent food for swine; and their importance for this purpose is clearly shown by the pannage laws enacted by Ine, king of Wessex, in the 7th century, for the regulation of rearing and fattening hogs, then, and for centuries afterwards, perhaps the most important agricultural pursuit of the people. Although the fruit of the British oak is neither so palatable nor so easily digested as to recommend itself for human food, that of many other oaks is sweet, wholesome, and nutritious. In Turkey the acorns of several kinds, after being buried in the ground for some time to deprive them of their bitter principle, are dried, washed, and ground to powder along with sugar and aromatics. The compound thus prepared is called *palamonte*, and a food is made from it named *racahout*, which is much esteemed by the ladies of the seraglios for maintaining their plumpness and good condition. The Barbary Oak (*Q. ballota*), the Evergreen Oak (*Q. Ilex*), the Italian Oak (*Q. Æsculus*) are European and African species, the fruit of which, especially that of the first named, is sweet and nut-like in flavour and wholesome to eat. The Dwarf Chestnut Oak (*Q. prinoides*), a North American species, and several others of that country also produce edible acorns. Among other oaks remarkable for the utility of their products are the Cork Oak (*Q. suber*; see CORK); the Valonia Oak (*Q. ægilops*), native of the Levant, and cups of which are said to contain more tannin per given bulk of substance than any other vegetable; the Black or Quercitron Oak (*Q. tinctoria*), an abundant native of the United States, the bark of which yields the *Quercitron* dye of commerce; the Gall Oak (*Q. infectoria*), a native of Asia Minor, furnishing the *gall-nuts* of commerce (see GALLS); the Kermes Oak (*Q. coccifera*), a native of the south of Europe, the Levant, and the north of Africa, which supplies the *kermes* or *scarlet grain* of commerce (see DYEING, Vol. IV. p. 139); and the Manna Oak (*Q. mannifera*), a native of Kurdistan, which secretes on its leaves in warm weather a sweet mucilaginous substance, that is made into highly esteemed sweetmeats. The timber of most of the American oaks is valuable. The following are the most esteemed as timber-trees: the White Oak or Quebec Oak (*Q. alba*), spread from the Gulf of Mexico to Canada, regarded as only inferior in quality to British oak; the Over-cup Oak (*Q. lyrata*), native of the southern states, occupying situations liable to inundation; the Chestnut-leaved White Oak (*Q. prinus*), also a native of the southern states; the Live Oak (*Q. virens*), extending from the Gulf of Mexico as far north as Virginia, regarded as the most valuable of American oaks for shipbuilding; the Red Oak (*Q. rubra*), pretty generally distributed in the United States and in Canada, furnishing the *Red Oak Staves* so much in demand in the West Indies. Of the Turkey Oak (*Q. cerris*) there are several interesting varieties, as the Fulham Oak (*Q. c. Fulhamensis*), which is semi-evergreen although the parent is strictly deciduous. The Austrian Oak (*Q. Austriaca*), the Evergreen or Holm Oak already named, and a number of the American species already noticed are much appreciated ornamental trees in Britain. Green oak is a condition of oak-wood caused by its being impregnated with the spawn of *Peziza æruginosa*, which communicates a beautiful tint of green, and of which the turners and cabinet-makers of Tunbridge Wells avail themselves for inlaying, bead-making, &c.—The Common Oak and most others cultivated in Britain delight in deep moist loamy soil, in which, however, there should be no stagnant water. Great depth is of more consequence than superior quality of soil. Plantations of oak are slow in coming to marketable value, except in the shape of copsewood, for which the oak is one

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of the best adapted trees, owing to the facility with which it stools or sends saplings up from its roots on being cut down. Copsewood oak is valuable for firewood, the making of charcoal for cooper work, and the making of crates, &c., while the bark is always marketable for the purpose of the tanner. The acorns of all species of oak supply oil in considerable quantity, which has been used in cookery and for other domestic purposes.

Many other trees bear the name oak popularly applied. Thus, the Poison Oak (*Rhus toxicodendron*), a shrub or small tree of North America, Indian Oak (*Tectona grandis*), African Oak (*Oldfieldia Africana*), and Stone Oak (*Lithocarpus javanensis*), which belongs to the same natural order with Quercus, are examples of the popular but erroneous use of the name oak.

See Evelyn's *Sylva* (1664); Strutt's *Sylva;* Camden's *Account of the New Forest;* Gilpin's *Forest Scenery;* Loudon's *Arboretum Britannicum; Trans. Highland and Agric. Soc.* (1881).

Oak-apple Day. See RESTORATION.

Oak-apples. See GALLS.

Oakham, the county town of Rutland, in the vale of Catmose, 25 miles WNW. of Peterborough. The castle, every peer passing which must forfeit either a horseshoe or a fine, is in ruins except the hall, used for county business. The fine parish church, with a lofty spire, was restored by Scott in 1858–59 at a cost of £6100; and Archdeacon Johnson's grammar-school (1584; reconstituted 1875) has an endowment of £1200 a year. Beer, boots, and hosiery are made. Pop. 3204.

Oakland, capital of Alameda county, California, is on the east side of San Francisco Bay, 4½ miles from San Francisco. It is a beautiful town, with wide streets adorned with evergreen oaks, and surrounded with gardens and vineyards. It is the terminus of the Southern Pacific Railroad, and steam ferry-boats ply constantly to San Francisco. Besides numerous churches and schools, a Congregational seminary, a large Roman Catholic college (1889), and the state home for the adult blind, the city contains canning-factories, manufactories of cotton and woollen goods, jute, iron, nails, shoes, pottery, carriages, and agricultural implements. Pop. (1870) 10,500; (1890) 48,690.

Oaks. See HORSERACING.

Oakum, a tangled mass of tarred hempen fibres, is made from old rope by untwisting the strands and rubbing the fibres free from each other. Its principal use is in Caulking (q.v.) the seams between planks, the space round rivets, bolts, &c., for the purpose of preventing water from penetrating. The teasing of oakum is well known as an occupation for prisoners in jail.

Oa'ses (through Latin and Greek from the Coptic), fertile spots in a desert, due to the presence of wells or of underground water-supplies. The best known and most historically famous are those of the Libyan Desert and the Sahara; they occur also in the deserts of Arabia and Persia, and in the Gobi. The French have created many oases in the Algerian deserts by sinking Artesian Wells (q.v.). The chief vegetation of the African oases is palms —especially date and doom palms; with barley, rice, and millet, when the fertile area is large enough to admit of settled occupation. In the Libyan Desert are the oases of Síwa (where was the temple of Jupiter Ammon; see AMMON) in the north, Farafa, Bahríya, Dakhel, and Khargeh (the *oasis magna*, 120 miles W. of Thebes). In the western Sahara Tuat, 1000 miles SW. of Tripoli, is the best known; in the eastern Sahara are Fezzan (q.v.), Gadames (q.v.), Bilma (q.v.), and Aïr (q.v.) or Asben. See DESERT.

Oates, TITUS, was born about 1650, the son of a Norwich ribbon-weaver who, from an Anabaptist preacher under Cromwell, became at the Restoration rector of All Saints', Hastings, where the boy was baptised on 20th November 1660. He was brought up at Oakham school, Merchant Taylors' (1665), and Sedlescombe in Sussex; entered Caius College, Cambridge (1667); and two years later was admitted a sizar at St John's. Next taking orders, he held several curacies and a naval chaplaincy, but was as often expelled for infamous practices, of which perjury was not the worst. So, in concert with a Protestant alarmist, the Rev. Dr Tonge, he resolved to concoct the 'narrative of a horrid plot,' and, feigning conversion to Catholicism, was admitted as 'Brother Ambrose' to the Jesuit seminaries of Valladolid and St Omer. From both in a few months he was expelled for misconduct, but, returning to London in June 1678, he forthwith communicated to the authorities his pretended plot, the main features of which were a rising of the Catholics, a general massacre of Protestants, the burning of London, the assassination of the king, and the invasion of Ireland by a French army. Charles treated the story with contempt; but Oates swore to the truth of it before a magistrate, Sir Edmund Berry Godfrey, who on 17th October was found dead in a ditch—murdered probably by Titus and his confederates. All London straightway went wild with fear and rage; Shaftesbury skilfully fanned the excitement; and Oates became the hero of the day. A pension of £600 was granted him, and a suite of apartments at Whitehall set apart for his use; wherever he went the mob cheered him as the 'saviour of his country.' Bedloe, Carstairs, Dangerfield, and other wretches came forward to back or emulate his charges; the queen herself was assailed; and 2000 Catholics were cast into prison. Fifteen of them were executed, including five Jesuits and old Viscount Stafford; but after two years a reaction set in, and Oates was driven from his rooms in the palace. In May 1683 he was fined £100,000 for calling the Duke of York a traitor, and being unable to pay was imprisoned; in May 1685 he was found guilty of perjury, and sentenced to be stripped of his canonicals, pilloried, flogged, and imprisoned for life. The Revolution of 1688 set him at liberty; and a pension was even granted him of £300; but in 1696 he writes to the Secretary of State, describing his worse than utter destitution. He died 13th July 1705. See the Histories of Burnet, Echard, Lingard, and Macaulay.

Oath, in Law, is the declaration, attested by the name of God, which is required on entering certain public offices and before giving evidence in a court of justice. Of oaths taken on entering office, the most important is the coronation oath, administered to the sovereign by an archbishop or bishop of the Church of England in presence of all the people (see CORONATION). The oaths required to be taken to government by the holders of certain offices have now been reduced to three in number —the oath of allegiance, the official oath, and the judicial oath. The oath of Allegiance (q.v.), 'to be faithful and bear true allegiance to her Majesty,' and the official oath, 'to well and truly serve her Majesty,' must be taken by all the principal officers of state in England, Scotland, and Ireland. Short forms of these oaths are provided in the Promissory Oaths Act, 1868, and in a schedule appended to this statute will be found a complete list of the officials to whom these different oaths are to be tendered. All the judges of the land on entering office, take, in addition to the oath of allegiance, what is known as the 'judicial' oath, 'to do right to all manner of people after the laws and usages of this realm, without fear or favour, affection, or ill-will.'

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Members of parliament now take only the oath of allegiance, which has come in the place of the several oaths of allegiance, supremacy, and abjuration formerly required from every member of both Houses of Parliament and from all persons holding office under the crown. Till comparatively recent times, oaths were required on many trivial occasions and from numerous classes of persons. By 5 and 6 Will. IV. chap. 62, and several succeeding statutes, however, nearly all these unnecessary oaths have been abolished and declarations have been substituted. Special oaths are, nevertheless, still taken by privy-councillors, by archbishops and bishops, by peers, baronets, and knights on their creation, by aliens on being naturalised, by recruits, and others.

The most important oaths affecting the general public are those which are administered in courts of justice to jurors and witnesses. Jurymen, who are called on to exercise their functions, whether in civil or criminal cases, are sworn 'to well and truly try the issue between the parties, and a true verdict give, according to the evidence.' Further, no person can give testimony upon any trial until he have in one form or another given a pledge that he will narrate the truth; he thus renders himself liable to the temporal penalties of perjury in the event of his wilfully and corruptly giving false testimony. In England, the oath which is administered to witnesses is in this form: 'The evidence I shall give shall be the truth, the whole truth, and nothing but the truth, so help me God.' The usage in England and Ireland is for the witness, after hearing the oath repeated by the officer of court, to kiss the New Testament by way of assent. The practice of kissing the book is a very old one, for there is extant (Cod. 3, 1, 14) an ordinance of the Emperor Julian prescribing that the oath be taken *sacrosanctis evangeliis tactis*. In Scotland the witness, standing and holding up his right hand, repeats the oath after the judge, as follows: 'I swear by Almighty God, and as I shall answer to God at the great day of judgment, that I will tell the truth, the whole truth, and nothing but the truth.' Children under twelve years of age are never sworn, but are admonished to tell the truth. Children between twelve and fourteen may take the oath, but only if the judge is satisfied that they understood its nature. By the Act 1 and 2 Vict. chap. 105, legislative sanction has been given to the rule of the common law that all persons shall be bound by the oaths which are lawfully administered to them, 'provided they are administered in such form, and with such ceremonies as the parties sworn declare to be binding on their consciences.' Thus, a Jew is sworn on the Pentateuch, with his head covered; a Mohammedan, on the Koran, laying his right hand flat on the sacred book and then touching it with his forehead. A Chinaman is sworn by the ceremony of breaking a saucer before taking the oath. As regards the persons entitled to administer oaths, Lord Brougham's Act of 1851 provides that 'every court, judge, justice, officer, commissioner, arbitrator, or other person, now or hereafter, having by law or by consent of parties authority to hear, receive, and examine evidence, is hereby empowered to administer an oath to all such witnesses as are called before them.' Further, by statute (18 and 19 Vict. chap. 42) all diplomatic and consular agents abroad are empowered to administer oaths and do notarial acts. At the same time the old practice of persons voluntarily taking oaths before a justice of the peace—e.g. by a debtor as a further security to his creditors, and in various instances not connected with any judicial proceeding—has been put an end to by the statute 5 and 6 Will. IV. chap. 62. It is here enacted that it shall not be lawful for any justice of peace, or other person, to administer or cause to be administered any oath, affidavit, or solemn affirmation, touching any matter of which he has no jurisdiction or cognisance. To some extent it is left to the discretion of the justice whether the particular matter is one as to which it is proper to administer an oath.

Of late years there have been made many alterations of the law as to oaths in relief of persons having conscientious scruples. Relief in this direction was first granted to Quakers, Moravians, and Separatists; they were allowed to make affirmation, whether as witnesses or on other occasions where an oath was formerly required (see AFFIRMATION). A further concession was made in 1854 to those who, not being Quakers, yet refused to take the oath from sincere conscientious motives, such being allowed also to affirm. Previous to 1869 atheists and persons who admitted that they had no religious belief were excluded from giving evidence in courts of justice. This exclusion of the testimony of atheists was put an end to, and at the same time the principle of substituting affirmations for oaths was largely extended by the Evidence Further Amendment Act of 1869 (32 and 33 Vict. chap. 68). This statute provides, 'If any person called to give evidence in any court of justice, whether in a civil or criminal proceeding, shall object to take an oath, or shall be objected to as incompetent to take an oath, such person shall, if the presiding judge is satisfied that the taking of an oath would have no binding effect on his conscience,' make a promise and declaration in a statutory form (sect. 4). When in 1880 Mr Bradlaugh, member for Northampton, claimed to make an affirmation under these Evidence Amendment Acts in lieu of taking the usual parliamentary oath, a select committee of the House of Commons reported that the acts did not apply to the oath taken by members of parliament. This view was confirmed in 1883 by the courts of law in the case of Clarke *v.* Bradlaugh, 7 Q.B.D. 38. In 1883 the government brought in a bill permitting members of parliament to affirm, but it was lost. Finally, however, in 1888, a short statute, 51 and 52 Vict. chap. 46, provides that every person upon objecting to be sworn, and stating as the ground of such objection either that he has no religious belief, or that the taking of an oath is contrary to his religious belief, shall be permitted to make his solemn affirmation, instead of taking an oath, in all places and for all purposes where an oath is and shall be required by law, which affirmation shall be of the same force and effect as if he had taken the oath; and if any person making such affirmation shall wilfully, falsely, and corruptly affirm anything which, if affirmed on oath, would have amounted to perjury, he shall be liable to prosecution as if he had committed perjury. Further, the Act 52 and 53 Vict. chap. 63, sect. 3, provides that in every statute passed since 1850, unless a contrary intention appears, the expressions 'oath' and 'affidavit,' in the case of persons allowed for the time being to affirm or declare instead of swearing, include affirmation and declaration, and the expression 'swear,' in the like case, includes affirm and declare. All the enactments relating to the administration of oaths are consolidated by the statute 52 Vict. chap. 10, known as the Commissioners for Oaths Act. See Stringer, *Oaths and Affirmations in Great Britain* (1889).—United States statutes permit the making of affirmation by those who object to take oaths. Some states grant further relaxations than others.

Oats (*Avēna*), a genus of edible grasses, containing many species, among which are some valuable for the grain which they produce, and some useful for hay. The Linnean genus Avena, as now

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restricted, has the spikelets in loose panicles, the glumes as long as the florets, and containing two or more florets; the palæ firm, and almost cartilaginous, the outer palea of each floret, or of one or more of the florets, bearing on the back a knee-jointed awn, which is twisted at the base. The awn, however, tends to disappear, and often wholly disappears in cultivation. Those species which are cultivated as corn-plants have comparatively large spikelets and seeds, the spikelets—at least after flowering—pendulous. The native country of the cultivated oats is unknown, although most probably it is central Asia. There is no reference, however, to the oat in the Old Testament; and although it was known to the Greeks, who called it *Bromos*, and to the Romans, it is probable that they derived their knowledge of it from the Celts, Germans, and other northern nations. It is a grain better suited to moist than to dry, and to cold than to warm climates, although it does not extend so far north as the coarse kinds of barley. The grain is either used in the form of groats or made into meal. Oatmeal cakes and porridge form great part of the food of the peasantry of Scotland and of some other countries. Oatmeal is now more largely used as food amongst the wealthier classes than formerly, but with the working-classes, alike in town and country, it is losing favour. No other grain is so much esteemed for feeding horses. Besides a large quantity of starch—about 65 per cent.—and some sugar, gum, and oil, the grain of oats contains almost 20 per cent. of nitrogenous principles, or protein compounds, of which about 16 or 17 parts are *Avenin*, a substance very similar to *Casein* (q.v.), and two or three parts gluten, the remainder albumen. The husk of oats is also nutritious, and is mixed with other food for horses, oxen, and sheep. From the starchy particles adhering to the husk or *seeds* after the separation of the grain, a light dish, long popular in Scotland under the name of *sowans*, is made by means of boiling water. The grain is sometimes mixed with barley for distillation. The Russian beverage called *kvass* is made from oats. The straw of oats is very useful as fodder, bringing, for that purpose, a higher price than any other kind of straw.

The varieties of oats in cultivation are very numerous, and some highly esteemed varieties are of recent and well-known origin. It is doubtful if they really belong to more than one species; but the following are very generally distinguished as species: (1) Common Oat (*A. sativa*), having a very loose panicle, which spreads on all sides, and two or three fertile florets in each spikelet, the palæ quite smooth, not more than one floret awned; (2) Tartarian Oat (*A. orientalis*), also called Hungarian Oat and Siberian Oat, distinguished chiefly by having the panicle much more contracted, and all turned to one side; (3) Naked Oat (*A. nuda*), differing from the Tartarian oat chiefly in having the palæ very slightly adherent to the seeds, which, therefore, fall readily out of them, whilst in the other kinds they adhere closely; (4) Chinese Oat (*A. chinensis*), which agrees with the last in the characters of the palæ and seeds, but is more like the common oat in its panicle, and has more numerous florets, 4–8, in the spikelet; (5) Short Oat (*A. brevis*), which has a close panicle turned to one side, the spikelets containing only one or two florets, each floret awned, the grains short. Almost all the varieties of oat in cultivation belong to the first and second of these species. The naked oat is cultivated in Austria, but is not much esteemed. The Chinese oat, said to have been brought by the Russians from the north of China, is prolific, but the grain is easily shaken out by winds. The short oat is cultivated as a grain-crop on poor soils at high elevations in the mountainous parts of France and Spain, ripening where other kinds do not; it is also cultivated in some parts of Europe as a forage plant.—Besides these, there is another kind of oat, the Bristle-pointed Oat (*A. strigosa*), regarded by some botanists as belonging even to a distinct genus, Danthonia, because the lower palea is much prolonged, and instead of merely being bifid at the point, as in the other oats, is divided into two long teeth, extending into bristles. The panicle is inclined to one side, very little branched; the florets, two or three in a spikelet, all awned, the grain rather small. This plant is common in cornfields, is cultivated in many countries, but chiefly on poor soils, and was at one time much cultivated in Scotland, but is now scarcely to be seen as a crop.—Not unlike this, but with the panicle spreading equally on all sides, the outer palæ merely bifid, and long hairs at the base of the glumes, is the Wild Oat (*A. fatua*), which is generally regarded by farmers as a weed to be extirpated, springing up so abundantly in some districts as to choke crops of better grain. Its awns have much of the hygrometrical property which gains for *A. sterilis*, a species found in the south of Europe, the name of the Animal Oat, because the seeds when ripe and fallen on the ground resemble insects, and move about in an extraordinary manner through the twisting and untwisting of the awns. The seed of the Wild Oat has been sometimes used instead of an artificial fly for catching trout.—Amongst the species of oat useful not for their grain but for fodder are the Downy Oat-grass (*A. pubescens*) and Yellow Oat-grass (*A. flavescens*), both referred by some botanists to the genus Trisetum—the short awn being like a middle tooth in the bifid palea—and both natives of Britain, the former growing on light ground and dry hills, especially where the soil is calcareous, the latter on light meadow-lands.

Far more ground is occupied with oats in Scotland than with any other grain. In all the higher districts it is almost the only kind of grain which is cultivated. Throughout Scotland it is the crop that is chiefly sown after land has been in pasture for one or more years. The seed is generally sown broadcast by hand over the ploughed land, which is afterwards well harrowed and rolled. Sowing by broadcast or drill machines is now largely practised, and in this case the harrowing is done before the seed is sown. On soils that are infested with annual weeds, such as charlock, it is common to drill the seed, which permits the land to be hand-hoed and thoroughly cleaned. Oats thrive best upon deep and good soils, especially if enriched by decayed vegetable matter. They yield but poorly on thin sandy soils, where they suffer sooner from drought than barley, rye, or wheat. The produce per acre varies from 20 to over 80 bushels, weighing from 36 lb. to 48 lb. per bushel. Common yields run from 32 to 56 bushels; average weight from 40 lb. to 44 lb. per bushel. A crop of 45 bushels per acre will absorb and carry away about 55 lb. of nitrogen, 46 lb. of potash, and 19½ lb. of phosphoric acid per acre. Few soils, in ordinary tillage, require the direct application of potash for oats. Very light soils are most likely to need it. Superphosphate of lime and nitrate of soda are suitable manures for oats; common quantities being from 1 to 2 cwt. of the former and from ½ to 1 cwt. per acre of the latter, applied as a top-dressing. The Potato Oat is a variety generally cultivated in the best soils and climates. It is an early and productive variety. The Hopetoun Oat is also much sown in the earliest districts. The Sandy Oat is still more largely sown, more particularly when the climate is inferior and wet. It is not liable to be lodged with rains, and the straw

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is of fine quality for fodder. All these are varieties of the Common Oat. The White and Black Tartarian are much cultivated in some districts. They are very productive, and well suited for feeding horses, cattle, and sheep. On the continent of Europe this grain is seldom seen of quality equal to what is produced in Scotland; even in most parts of England the climate is less suitable to it, and it is less plump and rich.

Ob, or OBI, the great river of Western Siberia, rises in two branches, the Biya and the Katun, both of which have their origin in the Altai Mountains, within the frontier of the Chinese dominions; and flows north-west and north for 2120 miles to the great Gulf of Ob in the Arctic Ocean. Its chief tributaries are the Irtish, Tcharysh, Tom, and Tchulym, all navigable. On the banks of the Ob are Barnaul, Tomsk, and Narym. At present only a few steamers ply on the great water-system of the Ob, which nevertheless seems destined to become a great commercial thoroughfare. The explorations of Professor Nordenskiöld, but more especially the tentative voyages of Captain Wiggins in 1874 and 1876, from Dundee through the Kara Sea to the Gulf of Ob, repeated in later years, have proved the feasibility of this direct route, and the accessibility of the great navigation system of the Siberian river to west European commerce.

Obadiah, the shortest book in the Old Testament canon, the work of one of the twelve 'minor prophets,' of whose personality absolutely nothing is known. The name is not uncommon, meaning 'servant of Jehovah,' and was borne by the devout chamberlain of Ahab (1 Kings, xviii. 3–16), who protected the prophets of the Lord from the fury of Jezebel. Delitzsch thinks the author of the prophecy may have been identical with the Obadiah mentioned in 2 Chron. xvii. 7, as one of the Levites sent by Jehosophat to teach the law in the cities of Judah. From internal evidence the date of composition of the book may, with much probability, be put shortly after the capture of Jerusalem by Nebuchadnezzar, about 587 B.C. The book was placed next to Amos merely because the prophecy of doom upon Edom is an amplification of that pronounced earlier by Amos (Amos, ix. 12). This passage in Obadiah (verses 1–9) is closely parallel to Jeremiah, xlix. 7–22, from which indeed Knobel, Bleek, and Reuss think it directly borrowed. Ewald maintained that the first seven verses of Obadiah were written by a prophet of that name during the inroads of Rezin and Pekah, that the eleventh refers to the capture of Jerusalem by the Arabs and Philistines in the reign of Jehoram, and that the remaining verses were compiled by a later writer, partly from the older prophet (who was also used by Jeremiah), and partly from other sources. Caspari offers strong reasons for his statement that the words of Obadiah were modified and expanded by Jeremiah. Some scholars again, as Keil, have supposed unnecessarily that Joel, ii. 32, is a distinct reference to Obadiah 17. The book of Obadiah possesses high individuality of style, and contains some peculiar words. It has ever been favourite reading among the Jews, and it was from it that they derived the name of 'Edom' as applied to Rome, to Christians, and all their enemies. The book falls naturally into two well-marked divisions, of which the first (1–16) denounces destruction to Edom, and the second (17–21) prophecies the restoration of Israel.

See the commentaries on the prophet by Ewald, Orelli, Hitzig, Keil and Delitzsch, and Pusey; the books on Hebrew prophecy by Kuenen (Eng. trans. 1877), Robertson Smith (1882), Duhm (1875); also the special commentaries by Hendewerk (1836) and Caspari (Leip. 1842); Archdeacon Perowne in the 'Cambridge Bible for Schools' (1883), and Farrar's *Minor Prophets* (1890).

Oban, a fashionable watering-place of Argyllshire, 84 miles WNW. of Stirling, and 136 of Edinburgh, by a railway opened in 1880. It curves round a beautiful and almost land-locked bay, which, sheltered from every wind by the island of Kerrera on the west and by the high shores of the mainland, forms a spacious haven, crowded in summer by yachts and steamers. A mere 'clachan' when Dr Johnson visited it in 1772, Oban began to be feued in 1803–20, and in 1832 was constituted one of the Ayr parliamentary burghs. It is now the great tourist headquarters of the West Highlands, possessing some thirty hotels and splendid steamboat facilities. Objects of interest are the picturesque ruins of Dunolly and Dunstaffnage Castles (see ETIVE), and a prehistoric cave-dwelling, discovered in 1890. Pop. (1821) 1359; (1871) 2413; (1881) 3991; (1891) 4856.

Obé, or OBI, the name given to the magical arts or witchcraft practised by *Obeah-men* and *Obeah-women* among the negroes of the West Indies and the United States. It is substantially similar to the corresponding superstitions all the world over. See HAYTI, NEGROES, MAGIC, WITCHCRAFT; and H. J. Bell, *Obeah: Witchcraft in the West Indies* (1890).

Obeid, EL, capital of Kordofan, in the eastern Soudan, 220 miles SW. of Khartoum, consists of a number of villages, originally separate and inhabited by distinct races, but now joined together into one town. Gum-arabic, ivory, gold, and ostrich-feathers are the chief articles of trade. Pop. estimated at 35,000. Near this place, in 1883, a force of Egyptians under Hicks Pasha, with an English staff, was exterminated by a large army of the Mahdi.

Obelisk (Gr. *obelos, obeliskos,* 'a spit'), a word applied to four-sided monuments of stone and other materials, terminating with a pyramidal or pointed top. These monuments were placed upon bases before gateways of the principal temples in Egypt, one on each side of the door. They served in Egyptian art for the same purposes as the stelæ of the Greeks and columns of the Romans, and appear to have been erected to record the honours or triumphs of the monarch. They have four faces, are cut out of one piece, and are broader at the base than at the top, at a short distance from which the sides form the base of a pyramidion in which the obelisk terminates. They were placed upon a cubical base of the same material, which slightly surpassed the breadth of their base. Each side of the obelisk at the base measures $\frac{1}{9}$th of the height of the shaft, from the base line to that where the cap or pyramidion commences. The cap is also $\frac{1}{9}$th of the same height. Their sides are slightly concave, to increase their apparent height. Their height varies from upwards of 100 feet to a few inches. The sides are generally sculptured with hieroglyphs and representations, recording the names and titles of kings, generally in one line of deeply-cut hieroglyphs down each side. Hewn in the rough out of a solid piece in the quarries, they were transported down the Nile during the inundation, on rafts, to the spot where they were intended to be placed, and raised from their horizontal position by inclined planes, aided by machinery. Some obelisks, before their erection, had their pyramid capped with bronze gilded, or gold, the marks of such covering still being evident on their surfaces. The use of obelisks is as old as the appearance of art itself in Egypt; these grand, simple, and geometric forms being used in the 4th dynasty, and continued till the time of the Romans. Their object is enveloped in great obscurity. At the time of the 18th dynasty it appears that religious ceremonies and oblations

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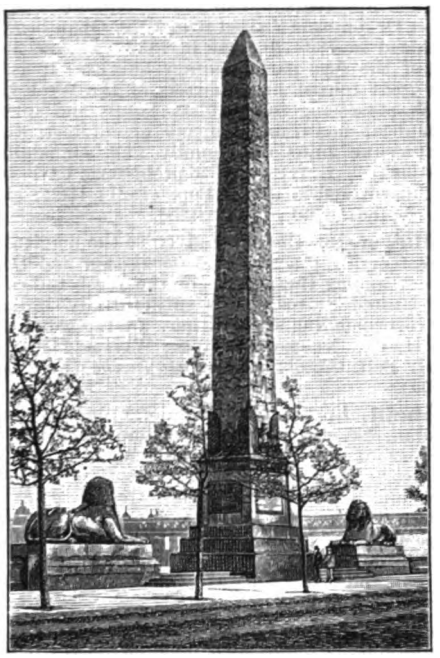
were offered to the obelisks, which were treated as divinities. Their sepulchral use is evinced by their discovery in the tombs of the 4th dynasty, and the vignettes of early papyri. The most of them date from the 18th and 19th dynasties. Two which formerly stood at Heliopolis (q.v.) were re-erected by Rameses II. at Alexandria, and have been



Cleopatra's Needle, Thames Embankment, London.

popularly known as Cleopatra's Needles. One, which long lay prostrate, was, after an adventurous voyage, brought to London in 1878, and erected on the Thames Embankment; it weighs 186 tons, and is 68½ feet high. The other, presented by the Khedive to the United States, was set up in Central Park, New York, in 1881. There are several large ones in Rome (that now at St Peter's having been taken to Rome by Caligula), one in Florence, one in Paris (given by Mehemet Ali in 1837), and Lepsius's in Berlin (the oldest and smallest of all, 2 feet 1½ inch high), besides many others that have found their way into European museums. By far the largest obelisk in the world is the Washington monument (1885), at Washington, D.C. It is of marble, 55 feet square at the base, and 555 feet high.

See Zoëga, *De Origine et Usu Obeliscorum* (1797); Birch, *Notes upon Obelisks* (1853); Gorringe, *Egyptian Obelisks* (1885).

Ober-Ammergau, a village in the valley of the Ammer in Upper Bavaria, 45 miles SW. of Munich, with 1400 inhabitants. Here the famous Miracle Play is performed every ten years. See MYSTERY.

Oberland. See BERN.

Oberlin, JOHANN FRIEDRICH, a pastor distinguished for his active benevolence and usefulness, was born at Strasburg, 31st August 1740, and in 1767 became Protestant pastor of Waldbach, in the Ban de la Roche or Steinthal, a wild mountainous district of Alsace. Here he spent the remainder of his life, combining an affectionate diligence in the ordinary duties of the pastorate with wise and earnest endeavours to promote the education and general prosperity of the people. The district had suffered terribly in the Thirty Years' War, and the scanty population which remained was sunk in poverty and ignorance. Oberlin introduced better methods of cultivating the soil, and various branches of manufacture, and made roads and bridges where required. He founded an itinerating library, began the first infant schools, and introduced ordinary schools in the district. Pastor Oberlin was latterly consulted in all that concerned the temporal and spiritual welfare of the people. The population, which was scarcely 500 when he entered on his labours, had increased to 3000 at the close of the century. The district still continues prosperous, and the population in 1890 was 6000. Oberlin was ably assisted in his reformatory labours by his pious housekeeper, Louise Scheppler, who survived her master eleven years. He died 1st June 1826. Notwithstanding the humble sphere in which his days were spent, his fame as a philanthropist has extended over the world, and his example has stimulated and guided many. The Royal Agricultural Society of France bestowed a gold medal upon him in 1818. A collected edition of his writings appeared at Stuttgart (4 vols. 1843).

See Sims's *Brief Memorials of Oberlin* (1830); the *Memoirs of Oberlin* (1852); and the biographies by Bodemann (1868), Spach (Paris, 1866), and Butler (1882).

Obermann. See SÉNANCOUR.

Oberon, the king of the elves or fairies, and the husband of Titania. The name is derived from the French *Auberon* or *Alberon*, and that from the German *Alberich* (*alb*, 'elf,' and *rich*). Oberon is first mentioned as 'Roi du royaume de la féerie' in the 13th-century French poem of *Huon de Bordeaux*. The quarrel between Oberon and Titania and their subsequent reconciliation through Huon, a French noble, and Amanda, daughter of the sultan of Babylon, whom the former leads home by the help of Oberon, after many difficulties, form the basis of this tale, which was afterwards shaped into a popular prose romance. The name first appeared in English in Lord Berners' translation (Early Eng. Text Soc. 1885), and was adopted in many ballads, and also in Greene's play, *The Scottish History of James IV.*, slain at Flodden. Neither these, however, nor Spenser's use made the name familiar, but Shakespeare's *Midsummer Night's Dream*, where, as Keightley points out, the fairy mythology is an attempt to blend the elves of the village with the fays of romance. The fairies here agree with the former in their diminutive stature, in their fondness for dancing, their love of cleanliness, and their child-abstracting propensities. Like the fays, they form a community ruled over by the princely Oberon and the fair Titania. Wieland used the subject for his well-known romantic poem, and Planché's adaptation of this forms the subject of Weber's opera. The old *chanson de geste* was edited by Guessard and Grandmaison (Paris, 1860). See Liebrecht's German translation of Dunlop's *History of Prose Fiction* (1851).

Obesity, or CORPULENCE, may be defined to be 'an accumulation of fat under the integuments or in the abdomen, or in both situations, to such an amount as to embarrass the several voluntary functions.' A certain degree of fatness is not only quite compatible with health, but, as has been shown in the article FATS, the fatty tissue is of considerable use in the animal body, partly in consequence of its physical and partly in consequence of its chemical properties; and it is only when the fatness begins to interfere with the discharge of any of the vital powers that it can be regarded as a morbid condition. Obesity may occur at any period of life, but it is most commonly after

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the fortieth year that the tendency to an inordinate accumulation of fat begins to show itself. After that time, in the case of men the pleasures of the table are usually more attractive than in earlier life, and much less muscular exercise is taken; while in women the cessation of the power of child-bearing induces changes which tend remarkably to the deposition of fat. The extent to which fat may accumulate in the human body is enormous. Daniel Lambert (1769–1809) weighed 739 lb.; his exact height is not recorded, but, according to the investigations of the late Dr Hutchinson (the inventor of the spirometer), the normal weight of a man 6 feet high should not exceed 178 lb. Dr Elliotson has recorded the case of a female child, a year old, who weighed 60 lb.

The predisposing causes of obesity are a peculiar habit of body, hereditarily transmitted; inactivity; sedentary occupations, &c.; while the more immediate or exciting causes are a rich diet, including fatty matters, and matters convertible in the body into fats, such as saccharine and starchy foods, and the partaking of such a diet to a greater extent than is necessary for balancing the daily waste of the tissues. 'Fat meats, butter, oily vegetable substances, milk, saccharine and farinaceous substances are the most fattening articles of food; whilst malt liquors, particularly rich and sweet ale, are, of all beverages, the most conducive in promoting obesity. The fattening effect of figs and grapes, and of the sugar-cane, upon the natives of the countries where these are abundant, is well known. In various countries in Africa and the East, where obesity is much admired in females, warm baths, indolence, and living upon saccharine and farinaceous articles, upon dates, the nuts from which palm-oil is obtained, and upon various oily seeds are the means usually employed to produce this effect' (Copland's *Dictionary*). The knowledge of the means of inducing obesity affords us the best clue to the rational treatment of this affection. It is a popular belief that the administration of acids—vinegar, for example, or one of the mineral acids—will check the deposition of fat; but if the desired effect is produced it is only at the cost of serious injury to the digestive, and often to the urinary organs. The employment of soap and alkalies, as advocated a century ago by Flemyng, is less objectionable than that of acids, but the prolonged use even of these is usually prejudicial. The efficacy of one of our commonest seaweeds, sea-wrack (*Fucus vesiculosus*), in this affection has also been strongly advocated. It is prescribed in the form of an extract, and its value is probably dependent on the iodine contained in it.

A very interesting *Letter on Corpulence*, published in 1863 by Mr William Banting (1797–1878), in which he records the effect of diet in his own case, after all medicinal treatment had failed, is well worthy of the attention of those who are suffering from the affection of which this article treats. The following are the leading points in his case. He was sixty-six years of age, about 5 feet 5 inches in stature (and therefore, according to Dr Hutchinson's calculations, ought to have weighed about 142 lb.), and in August 1862 weighed 202 lb. 'Few men,' he observes, 'have led a more active life . . . so that my corpulence and subsequent obesity were not through neglect of necessary bodily activity, nor from excessive eating, drinking, or self-indulgence of any kind, except that I partook of the simple aliments of bread, milk, butter, beer, sugar, and potatoes, more freely than my aged nature required. . . . I could not stoop to tie my shoe, nor attend to the little offices humanity requires without considerable pain and difficulty; I have been compelled to go downstairs slowly backwards, to save the jar of increased weight upon the ankle and knee joints, and been obliged to puff and blow with every slight exertion.'

By the advice of a medical friend he adopted the following plan of diet: 'For breakfast I take four or five ounces of beef, mutton, kidneys, broiled fish, bacon, or cold meat of any kind except pork; a large cup of tea (without milk or sugar), a little biscuit, or one ounce of dry toast. For dinner, five or six ounces of any fish except salmon, any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira: champagne, port, or beer forbidden. For tea, two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar. For supper, three or four ounces of meat or fish, similar to dinner, with a glass or two of claret' (p. 18). 'I breakfast between eight and nine o'clock, dine between one and two, take my slight tea meal between five and six, and sup at nine' (p. 40). Under this treatment he lost in little more than a year (between the 26th of August 1862 and the 12th of September 1863) 46 lb. of his bodily weight, while his girth round the waist was reduced 12½ inches. He reported himself as restored to health, as able to walk up and down stairs like other men; to stoop with ease and freedom; and safely to leave off knee-bandages, which he had *necessarily* worn for twenty years past. He made his own case widely known by the circulation of his pamphlet (which has passed through several editions), and 'numerous reports sent with thanks by strangers as well as friends' show that 'the system is a great success;' and that it is so we do not doubt, for it is based on sound physiological principles. Other more or less similar systems have since been recommended; one, with two successful cases, is recorded in the Edinburgh *Medical Journal* for December 1890. Such a radical change of diet, however, should not be adopted without medical advice, as in some cases it might cause disturbance of digestion or excretion, and lead to new dangers to health. See FASTING, TRAINING.

Obi. See OB, and OBÉ.

Object, and its correlative, SUBJECT, are terms used in a perplexing multiplicity of senses, the same author, philosophical or semi-philosophical, being frequently inconsistent in the meaning attached by him to the words. Thus, it may be said that while ordinarily the *subject* is the knowing mind, the *object* is that which is known, thought, felt, seen, imagined—the psychological corresponding fairly with the grammatical usage. At another time the subject is the ego, while the object is the non-ego, the external world, with an implication that the objective has a firmer, surer ground, if not wholly independent of the subjective, then at least less liable to vary or fluctuate. On the other hand, if the *noumenon*, the subject, is the truly real, the phenomenal object is comparatively an accident. Yet again, that which is the law of the consciousness, which is prior to experience, is by some regarded as more indefeasible and objective than the fleeting elements of conscious experience. For some, objective is that which is common to *all* minds (and to the absolute mind) at all times, and the subjective that which is peculiar to my mind or any given mind at any given time. Thus the essence of the subjective becomes the most objective thing in existence; really objective truth is that which from the nature of the case is prior to and independent of experience. It is needless to point out that, when the subject thinks of itself, the subject may be said to become its own object. In general, however, that is objective which deals

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much with the external world, and that subjective which is mainly based on introspection of mental states.

In addition to the possibility of confusion arising out of current usage, it should be remembered that in the middle ages, and even in Descartes and Spinoza, *subject* nearly meant the same as *substance* (something highly real); and in William of Ockham *objective* is that which the mind feigns, the image or representative idea as opposed to the real object which exists independently. Object used as 'end,' 'aim,' 'purpose' ('with the object of doing so and so') is a barbarous but irrepressible abuse. Coleridge is by no means the only writer who fails to make himself clear about the distinction between 'omm-jective' and 'summ-jective,' as Carlyle represents him.

Oblates (Lat. *oblatus, oblata*, 'offered up'), the name of a class of religious bodies in the Roman Catholic Church, which differ from the religious orders strictly so called in not being bound by the solemn vows of the religious profession. The institute of oblates was one of the many reforms introduced in the diocese of Milan by St Charles Borromeo, towards the close of the 16th century. The members consisted of secular priests who lived in community, and were merely bound by a promise to the bishop to devote themselves to any service which he should consider desirable for the interest of religion. St Charles made use of their services chiefly in the wild and inaccessible Alpine districts of his diocese. The oblates of Mary Immaculate, founded at Marseilles in 1815, have nine houses in Britain, two in Ireland, and are numerous in Canada, British India, and the United States. Two Irish reformatories are under their charge.

Obligation, Days of, holidays on which faithful Catholics are bound to abstain from servile work and to hear mass. These are, for England and Wales, Circumcision, Epiphany, Ascension Day, Corpus Christi, SS. Peter and Paul, Assumption, All Saints, Christmas Day. Scotland adds to these St Andrew, and Ireland St Patrick and the Annunciation.

Oboe.

Obock, a French possession on the African coast of the Red Sea, inside Bab-el-Mandeb, and opposite Perim. Area, 2300 sq. m.; pop. (1886) 22,370.

Oboe (Fr. *hautbois;* Ger. *hoboe, hochholz*), a treble reed musical instrument, to which the bassoon may be said to be the bass. Its reed is double, like that of the bassoon and the chanter of the bagpipe, and consists of two thin blades of cane attached by silk thread to a short metal tube. A similar instrument may be traced from the earliest times from Egyptian and Greek sculpture and paintings; and the Kensington Museum contains many specimens from Arabia, China, India, Wallachia, &c. The modern instrument, however (shown in the figure), from successive improvements and additions bears little resemblance to its ancient prototype, and is one of the most complicated and intricate of wind-instruments. It is made variously of boxwood, ebony, cocoa-wood, and silver, having holes for the fingers and usually fifteen keys, besides two automatic octave keys to assist the higher notes. It is an octave instrument like the Flute (q.v.), and its usual compass is from B below the stave to F in alt, although several semitones higher can be produced. For orchestral purposes it is pitched in the key of C, but in military bands a B♭ instrument is sometimes used, and its music is written in the G clef. The tone of the oboe is rich, and, from its great power in swelling and diminishing the sound, it is capable of every variety of expression. The oboe has the privilege of giving the pitch to the violin in the orchestra. Beethoven, Mozart, Bach, and nearly all the great composers make extensive use of the oboe in their compositions. The Oboe d'Amore and the Oboe di Caccia, oboes in the key of A and F or E♭ respectively, are nearly obsolete. —*Oboe* is also the name of a treble stop on the organ, its bass being the *bassoon*. See 'Oboe,' in Grove's *Dictionary*.

Obolus (Gr. *obolos* or *obelos*, 'a spit;' see Numismatics, p. 550), the smallest of the four common Greek coins and weights, the sixth part of a Drachma (q.v.).

O'Brien, William Smith, Irish patriot, was born 17th October 1803. Descended from the royal line of Thomond, to which belonged the great king, Brian Boru, he was the second son of Sir Edward O'Brien, Bart., of Dromoland, in County Clare, in favour of whose eldest son the ancient barony of Inchiquin was revived in 1862. He was educated at Harrow and Trinity College, Cambridge, and entered parliament for the pocket borough of Ennis in 1826. Though a Protestant, he supported the Catholic claims; and for some years he gave an independent support to the Tory party. He lost his seat in 1831, but was returned for the county of Limerick in 1835, and from that time till 1843 generally supported the Whigs. But he gradually gave up hope of getting justice for Ireland from the imperial parliament, and on the 20th October 1843 he announced his adhesion to O'Connell's Repeal Association. But O'Connell's rooted aversion to an appeal to *physical* force soon made a wide gulf in sympathy between his party and those fiery spirits who became known as 'Young Ireland,' and whose fervid and warlike poetry and prose filled the columns of the *Nation* newspaper. To this party O'Brien soon joined himself, and the *moral* force policy, by means of which O'Connell had gained so many triumphs, was now abandoned by the group of young and eager enthusiasts. The death of Thomas Davis in September 1845 removed a man of unusual wisdom and powers of conciliation, and after many angry disputes O'Brien in 1846 withdrew from the Association, and next the Young Irelanders set up a Repeal League of their own, under the leadership of O'Brien. His honour and patriotism are undoubted, not so his practical wisdom; and his ardent temperament and the sight of the sufferings of his country soon hurried him on to dangerous courses, and brought him into collision with the law. Still his views were much more moderate and sensible than those of some of the zealots of his party. The sentence of John Mitchel for 'treason-felony' in the spring of 1848 hastened the projected rising, which, however, proved a miserable fiasco, ending ludicrously in an almost bloodless battle in a cabbage-garden at Ballingarry, in County Tipperary. Smith O'Brien was arrested, tried by a special commission at Thurles, and sentenced to death; but the sentence was commuted to transportation for life. In May 1854 he was released on condition of not returning to Ireland, and in 1856 he received a free pardon. He spent his remaining years in private life, partly at Bangor in North Wales, and died there, 16th June 1864. See A. M. Sullivan's *New Ireland* (1877), and Sir C. G. Duffy's *Young Ireland* (1880).

Obscene Prints, Books, or **Pictures** exhibited in public render the exhibitor liable to be indicted for a misdemeanour. Persons exposing them in streets, roads, or public places are also liable to be punished as rogues and vagabonds with hard labour. An important change in

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the law was effected by Lord Campbell's Act, which was passed in 1857, to suppress the traffic in obscene books, pictures, prints, and other articles. Any two justices of the peace, or any police-magistrate, upon complaint made before him on oath that such books, &c. are kept in any house, shop, room, or other place, for the purpose of sale, or distribution, or exhibition for gain or on hire, and that such things have been sold, &c., may authorise a constable to enter in the daytime, and, if necessary, use force by breaking open doors, or otherwise to search for and seize such books, &c., and carry them before the magistrate or justices, who may, after giving due notice to the occupier of the house, and being satisfied as to the nature and object of keeping the articles, cause them to be destroyed.

Obscurantists ('lovers of darkness;' Lat. *obscurare*, 'to darken'), the name given to those who are supposed to look with dislike and apprehension on the progress of knowledge, especially to such as defend theological prejudices against what is believed to be scientific truth.

Observantists. See FRANCISCANS.

Observatory, an institution supplied with instruments for the regular observation of natural phenomena, whether astronomical, meteorological, or magnetical. In some observatories all three classes of observation are carried on, but in most cases special attention is paid to astronomy alone, and only such meteorological observations are taken as are required for the calculation of the effect of atmospheric refraction on the position of a heavenly body; there are, however, several observatories which are devoted solely to meteorological or magnetical observations.

The most important work which is carried out in public astronomical observatories is the determination of the movements of the sun, moon, and planets among the stars; and, as a corrollary to this, the relative positions of the stars to which the other heavenly bodies are referred. In early times the Greek astronomers fixed these positions by means of Armillary Spheres (q.v.) and Astrolabes (q.v.). Ptolemy made use of a Quadrant (q.v.); and many centuries after Tycho Brahé converted this form of instrument into an Altazimuth (q.v.), with which he made a long series of observations of the altitudes and azimuths of the heavenly bodies at the observatory which the king of Denmark erected for him; and he also measured with great assiduity their angular distances from each other by means of a Sextant (q.v.). It was not till the middle of the 18th century that the improvement of the clock by Graham enabled astronomers to rely on it for the determination of right ascensions by the times of passage across the meridian by means of a quadrant. A pair of such instruments pointing respectively north and south were erected at the Royal Observatory, Greenwich, and used by Bradley and his successors from 1750 till they were displaced by the Mural Circle (q.v.). At the same time the accuracy of readings was greatly increased by the invention of the micrometer-microscope, which made it possible to measure spaces to $\frac{1}{100000}$th of an inch. Neither the quadrant nor the mural circle, however, could be relied upon for accurate motion in the plane of the meridian, but Römer remedied this defect by inventing a separate instrument, the Transit (q.v.). With the transit and quadrant Bradley commenced that series of observations of the positions of the sun, moon, and planets, and of stars for reference, which has been continued ever since at Greenwich, and on which, in combination with less extensive series at Paris and Königsberg, all our tables of the motions of the heavenly bodies are founded. In modern observatories the transit and mural circle are combined into one instrument, the Transit-circle (q.v.). An important auxiliary to the transit-circle is the chronograph, an American invention, which, in various forms, is now found in all well-equipped observatories, the principle in all cases being the same—viz. the registration on a revolving cylinder of paper of the times of transit across the system of spider-lines of the transit-circle, as well as of the seconds of the sidereal clock, by means of electric currents, which pass through electro-magnets when the circuit is closed either by the observer or the clock, thus causing a momentary attraction of a piece of soft iron, and producing a corresponding mark on the paper either with a pen or a steel point. This system, while improving somewhat the accuracy of the individual observations, admits of a large number being made at intervals of two or three seconds, and leaves the observer free to make several observations of zenith distance during the passage of a star across the field of view. The observations of stars at the observatories of Greenwich, Paris, Washington, and Oxford are mainly directed to the most accurate determination of the places of a limited number, and the deduction of their proper motions by comparison with the results obtained by Bradley, Piazzi, and Groombridge; at other observatories differential or zone observations of large numbers of stars have been made, with the object of making a complete and tolerably accurate survey of the heavens.

A large number of observatories, chiefly in Germany and America, are devoted to a very different class of observations—viz. differential observations with the Equatorial (q.v.) of comets and small planets as referred to comparison-stars, and the search for such objects; whilst at other observatories, among which that of Pulkova may be mentioned, the measurement of double stars with the micrometer is laid down as the chief object. Of late years two new subjects have been introduced in the routine of observatory work—photography and spectroscopy. The former was carried on for many years at Kew Observatory under Mr De La Rue's auspices, and at his private observatory at Cranford, and the work is now being continued at many observatories, both public and private; the latter has been taken up at a number of Italian observatories, and particularly at Rome by P. Secchi, and it now forms part of the regular system at Greenwich; whilst the observatories at Paris, Berlin, and Vienna are equipped for these physical observations, and in America and Australia they are vigorously carried on at several observatories—Melbourne, in particular, being provided with a four-feet equatorial reflector for this purpose, as well as for the examination of nebulæ. The most important work of an observatory, however, consists not in making observations which are easily multiplied, but in reducing and publishing them—a task of far greater labour, and requiring far higher qualifications. However various may be the observations, the mathematical method of eliminating their errors is the same in all cases; and it is when such treatment is required in any inquiry that it should be undertaken at a public observatory, where this rigorous method will be applied.

In addition to regular astronomical observations of all kinds, national observatories are usually charged with the distribution of time signals, and the rating of chronometers for the navy—matters of great practical importance, especially in Great Britain, where Greenwich time is communicated directly by telegraph to more than 600 towns.

There were observatories amongst ancient

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Babylonians and Egyptians. Of modern observatories that at Cassel dates from 1561, Tycho Brahé's at Uranienburg from 1576; that of Greenwich (q.v.) was founded in 1675. The oldest in the United States is the Hopkins Observatory, Williams College, erected in 1836; now there are upwards of sixty, of which those of Washington and Harvard, and the Lick (q.v.) Observatory are the chief. The highest in the world is that on Mont Blanc, at a height of 14,470 feet.

Obsidian, a natural glass—the vitreous condition of an acid lava. It is hard and brittle, with remarkably vitreous lustre, and perfectly conchoidal fracture, the edges of the fractures very sharp and cutting like glass. It varies from semi-transparency to translucency only on the edges. It is often black or very dark gray; sometimes green, red, brown, striped, or spotted; and sometimes *chatoyant* or *avanturine*. Some obsidians are rendered porphyritic with microscopic crystals of sanidine; others are often highly vesicular and plentifully charged with spherulites usually arranged in the line of lava-flow. The rock is usually rich in crystallites and microlites (the 'beginnings of crystallisation'), which are frequently arranged in parallel or undulating lines = 'fluxion-structure.' Steam- or vapour-pores of minute size occur abundantly in some obsidians. Obsidian is thus a kind of lava. It is capable of being polished, but is apt to break in the process. It is made into boxes, buttons, ear-drops, and other ornamental articles; and before the uses of the metals were well known it was employed, in different parts of the world, for making arrow and spear heads, knives, &c. It is found in Iceland, the Lipari Isles, Vesuvius, Sardinia, Hungary, Spain, Teneriffe, Mexico, South America, Madagascar, Siberia, &c. Black obsidian was used by the ancients for making mirrors, and for this purpose was brought to Rome from Ethiopia. It was used for the same purpose in Peru and Mexico. Mirrors of black obsidian are indeed still employed by artists. Chatoyant or avanturine obsidian is very beautiful when cut and polished, and ornaments made of it are sold at a comparatively high price.

Obstetrics (Lat. *obstetrix*, 'a midwife,' from *obsto*, 'I stand before,' thus literally 'a woman who stands before or beside another'), called also MIDWIFERY (A.S. *mid*, 'together with,' and *wif*, 'a woman'). As a branch of medical science and practice obstetrics is concerned with the study and care of women during the processes of pregnancy, parturition, and the puerperium, or lying-in. As a department of medical study it embraces the anatomy and physiology of the female organs of generation, the phenomena of conception and pregnancy, of labour, normal and abnormal, and of the puerperium and the return of the organs to their non-pregnant condition. Strictly speaking, these processes are normal and physiological, and in perfectly natural conditions require little or no skilled help or assistance. But, while theoretically this may be so, it is still the case that these processes each produce an effect on the female organism which results in great modifications of the ordinary vital functions, so that the condition is one of continued physiological tension, which at any moment may pass into a pathological or abnormal condition in which skilled assistance is of the utmost importance. There can further be no doubt that many influences at work in states of civilisation tend greatly to increase the dangers of the reproductive process, so that the members of highly civilised communities are peculiarly liable to disaster; but at the same time the rudest savages are by no means free from these risks, and the care which most of them take of their women during pregnancy and parturition amply proves how conscious they are of this fact (but see COUVADE). The dangers with which the reproductive process is associated may be in some measure realised when it is understood that during pregnancy women are liable to be affected by many of the ordinary diseases in an aggravated form, which may give rise to premature expulsion of the ovum—abortion—a process in itself attended by grave dangers; that during parturition the child may present by some part of the body other than the head, causing increased difficulty, often impossibility of spontaneous delivery; that there may be some disproportion between the size of the child's head and the pelvis, due to disease or deformity; that from disease or exhaustion the uterus may be incapable of expelling its contents; that after the birth of the child the natural processes for checking hemorrhage from the site of the placenta may be at fault, or again the retention of a blood-clot or fragments of placenta may expose the patient to the risks of septicæmia or blood-poisoning. These are but a tithe of the dangers which surround the reproductive process, but they give an ample explanation of the existence of a science and art of obstetrics by which these and similar dangers may be obviated. With regard to parturition itself it may be noted that the great majority of labours (95 per cent.) are natural—i.e. the head presents, and they are spontaneously accomplished within twenty-four hours. But in civilised countries, and under the best practice, it is estimated that one in 120 women dies within a fortnight after labour. It would be out of place in a work of this kind to enter into the details of this science, but a sketch of the history of its origin and development may be of interest.

Until about the beginning of the 16th century the practice of obstetrics was mainly empirical. It was founded on experience and superstition, and was in great measure destitute of an anatomical or physiological foundation. Such practice is seen in the present day among uncivilised races, and we find procedures described as employed by the Egyptians, Jews, Greeks, and Romans in vogue among the North American Indians and negroes at the present time. During the empirical period we find, as we might expect, that the ordinary practice was wholly in the hands of women. At first female friends and neighbours would perform what kindly offices they could, but soon a distinct class of midwives arose, whose experiences or special aptitude fitted them for the duty. All ordinary labours were attended by them, and they did not yield up a difficult case to the surgeon or physician until they had exhausted a code of practice partly reasonable as founded on experience, partly superstitious, but often very elaborate. When these resources failed, the aid of the male practitioner, who combined the offices of priest and physician, was usually invoked. At first the aid yielded by these was largely based on superstition, consisting in charms, incantations, and invocation of special deities. Eilithyia among the Greeks and Lucina among the Romans were the chief deities presiding over childbirth, though among the Romans particularly a number of minor deities were regarded as specially available for special complications. With the growth of medical knowledge the purely religious office of the priest became detached from that of the physician, and among the Egyptians in quite early times the physician became a separate functionary and rendered much more practical aid. The ignorance of the anatomy of the organs involved greatly limited their practice, and cases of difficult or delayed labour were usually treated by Cæsarean (q.v.) section, or later by some form of embryotomy.

The writings of Hippocrates (400 B.C.) contain

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the earliest attempt to formulate a practice of obstetrics. While his writings on this subject show keen observation and shrewd judgment, yet his imperfect anatomical knowledge led him into grave errors. The presentation of the head was the only way by which he considered it possible that delivery could be effected, and then cephalic turning was enjoined by him in all cases where the head did not come first. When this was found to be impossible, as in many cases it must have been, embryotomy or Cæsarean section were the only alternatives. For over 300 years the teaching of Hippocrates was practically unquestioned, until the study of anatomy in Alexandria, under the Ptolemies, served to clear up many of his errors, and so advance the art. To the knowledge of anatomy gained here is due the great advance in obstetrics shown by the Greek physicians who practised in Rome about the beginning of the Christian era. Chief among these is Soranus (98–137 A.D.), who published a work 'on the diseases of women,' which shows a wonderful advance in the knowledge of the anatomy of the female organs of generation. He further showed a knowledge of obstetrics which is a long way ahead of Hippocrates. He insisted upon the safety of foot and breech presentations, and recommended and described the operation of podalic turning. He showed the importance of posture in favouring difficult labours, and gave careful instruction for the performance of various destructive operations. After Soranus came Galen (born 130 A.D.), who gave an account of obstetric art as it existed at that time, but whose anatomy was very defective as compared with that of Soranus. His teaching and opinions seem to have largely influenced the Persians, and through them the Arabs, for their practice all through the middle ages seems to have been founded on Galen. Probably about the 4th century a remarkable book was published by Moschion, *Peri tōn Gunaikeiōn Pathōn*, which is sometimes, though not quite correctly, called the first obstetric work published. It is based on Soranus, and shows a much sounder anatomical knowledge than Galen possessed. Three hundred years later Paulus Æginetus published a work on this subject which is really a compilation from previous authors, and shows no advance on Moschion. From this time until the beginning of the 16th century it may be said that obstetrics made no progress. Indeed, with the fall of the Roman empire this, like other arts and sciences, fell on evil days, and the knowledge was in great measure lost and its practice degenerated, gradually passing into the hands of the lowest and most degraded women. All trace of the earlier teaching was lost with the knowledge of the anatomical principles on which it rested; practice was regulated by the grossest superstition and ignorance, and the male practitioner was never allowed to enter a lying-in room save as a last resort. Indeed, the practice of midwifery by men was for many centuries in Europe regarded as a crime and an offence against morals, and so late as 1522 Wertt of Hamburg, who donned female attire in order to permit his attending and studying a case of labour, was detected and publicly burned at the stake. And a hundred years later a Dr Willughby, an Englishman, whose daughter was a midwife, crawled into a darkened room on his hands and knees in order to assist her at a difficult labour! Nothing could have been more deplorable than the state of obstetric practice during this period, and the suffering and mortality resulting from this condition of affairs could not be easily estimated.

The first indication of a new order of affairs is found in the training of midwives in the medical school of Salerno about the beginning of the 16th century. Some time previously this school had inaugurated the study of anatomy, and the light shed thereby had its influence on the dark and degraded practice of obstetrics. Progress was, however, slow, and its practice still largely remained in the hands of women, to whom clung the superstition of the dark ages. Yet in the hands of anatomists like Vesalius, Fallopius, Berengarius, and surgeons such as Paré, a scientific basis was again being laid, and the knowledge of Soranus and Moschion being rediscovered. And, while all ordinary labours were managed by women, the surgeons were called in to assist when a difficulty arose. By them turning was rediscovered, and embryotomy, Cæsarean section, &c. were restored and developed on more scientific principles. By-and-by, especially in France, the practice of obstetrics by surgeons gradually gained ground, though there, and still more elsewhere, its practice by men lay under a reproach. The invention of the obstetric forceps by the Chamberlens, about the beginning of the 17th century, gave a great impulse to the art. In 1668 Mauriceau published his *Treatise*, which ran through seven editions, and was for long the standard work on the subject. It was translated into English by Hugh Chamberlen in 1672, and it seems to be about this time that men began generally to engage in the practice of midwifery: Harvey, the Chamberlens, and others took it up in England; whilst La Vallière, the mistress of Louis XIV., by employing Julian Clement, a surgeon of high eminence, in her first confinement in 1663, did much to establish the practice in France.

Since the revival of the study of anatomy and physiology the progress of scientific obstetrics has been steady and sure. The reproach under which its practice so long lay has been entirely removed, and the colleges of physicians, which at one time refused their fellowships to any one engaged in obstetric practice, now receive them on the same terms as other physicians, and all medical licensing bodies demand an adequate knowledge of its theory and practice from every candidate for their diplomas. The science and practice have been built up by a host of workers, the mere mention of whose names here space precludes. But it may be of use to indicate some of the great advances and discoveries on which the art rests.

(1) *The Rediscovery of Podalic Version or Turning.*—In 1550 Paré described this operation, whose value had been recognised and its method described in the 1st century by Soranus. This had been lost to practice since the 7th century. Paré showed how it could be performed, and pointed out its advantages in saving fœtal life; and it is certain many children were delivered safely by this means whose lives could not have been otherwise saved. The operation has been extended and modified in various ways since, but that described by Paré is at the present day the one most usually performed.

(2) *The Invention of the Forceps.*—About the end of the 16th or beginning of the 17th century, the forceps was invented by Dr Peter Chamberlen, a son of a William Chamberlen, a Huguenot refugee, living in England (see FORCEPS). The secret, long kept, ultimately leaked out, and by 1747 the instrument was generally known and employed. The original instrument was modified by Levret of Paris, Smellie and Simpson in Great Britain; and, more recently, its construction has been elaborated by Tarnier of Paris on what is called the 'axis-traction' principle. It may safely be said that no single invention has been more successful in saving life and relieving suffering.

(3) *The Employment of Anæsthetics.*—In 1847 Sir James Simpson first employed chloroform anæsthesia to relieve the pain of labour, and this

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certainly marks one of the most beneficent advances in the history of obstetrics—probably the greatest since the invention of the forceps. Besides relieving and abolishing untold suffering in ordinary labour, it permits the performance of many operations and the correction of untoward conditions which previously were impossible or irremediable. It should be added that Hypnotism (q.v.) has within recent years been employed on the Continent for the same purpose.

(4) *The Employment of Antiseptics and the Prevention of Puerperal Fever.*—Till 1870 the great scourge of maternity hospitals, and also a frequent cause of disaster in private practice, was the prevalence of outbreaks of puerperal fever or septicæmia. In that year the teaching of Lister began to influence obstetric practice, and since then rigorous antiseptics are the rule in all maternity hospitals. Thus a mortality reaching in many instances to 6 per cent. of all cases has been reduced almost to zero, and this opprobrium of obstetric practice has been removed.

The teaching of midwifery is provided for in the curricula of all the medical schools of the United Kingdom. In most a three months' course of lectures with attendance on a certain number of cases is demanded of each student. The Scottish universities require attendance on a six months' course of 100 lectures, besides practical training by the bedside. As has been said, the licensing bodies demand an adequate knowledge of midwifery from every candidate for a license to practise; and further, at every maternity hospital the training of nurses by lectures and demonstration is regularly carried on. The ignorant midwife of the past is thus being replaced by trained women, who are competent to undertake the management of all ordinary cases of labour. There is, however, considerable room for improvement in the training and certification of these midwives. In recent years, in Great Britain and elsewhere, the facilities offered to women to obtain a full medical training are being greatly increased, and it is not unlikely that in course of time a very large part of the practice in this department, at the present undertaken by men, may be transferred to women. And that properly educated women are capable of undertaking all the responsibilities of this department of practice is shown by such cases as those of Mesdames Boivin and Lachapelle, who (in the words of Velpeau), 'although the pupils of Baudelocque, were not afraid to shake off, to a certain extent, the yoke of his scientific authority, and whose high position and dignity form the starting-point of a new era for the science of obstetrics in Paris.'

See amongst English works on the subject those of Playfair and Barnes; American, those of Lusk and Parvin, and the *American System of Obstetrics;* the French treatise by Tarnier and Budin; and German works by Schroeder, Spiegelberg, and Winckel (all of which have been translated). See also articles in this work on ABORTION, CÆSAREAN OPERATION, FŒTUS, FORCEPS, PREGNANCY, &c.

Ocarina, a recent Italian toy-instrument of flute-like sound, made of pottery, and shaped like the body of a bird (without head or neck).

Occam, WILLIAM. See OCKHAM.

Occasionalism. See DESCARTES.

Occleve, THOMAS. See HOCCLEVE.

Occlusion, a term applied to the solution of a gas by a melted solid—as of oxygen by melted silver—which gas is given up by the melted material when it solidifies, so that in the case of silver the metal sometimes 'spits' or gives off the gas in bubbles, thereby roughening its otherwise smooth surface. Sometimes the gas is absorbed or 'occluded' (in a wider sense) even though the metal be not fused—e.g. hydrogen gas by cold palladium, carbonic oxide by red-hot cast-iron.

Occultations (Lat. *occultatio*, 'a concealment') are neither more nor less than 'eclipses;' but the latter term is confined by usage to the obscuration of the sun by the moon, and of the moon by the earth's shadow, while the former is restricted to the eclipses of stars or planets by the moon. Occultations are phenomena of frequent occurrence; they are confined to a belt of the heavens about 10° 17½′ wide, situated parallel to and on both sides of the equinoctial, and extending to equal distances north and south of it, being the belt within which the moon's orbit lies. These phenomena serve as data for the measurement of the moon's parallax; and they are also occasionally employed in the calculation of longitudes.

Occultism. See MAGIC, ALCHEMY, ASTROLOGY, THEOSOPHY.

Ocean, generally the body of salt water that separates continent from continent, embracing altogether about three-fifths of the whole surface of the earth. The separate oceans are the Atlantic, separating America from Europe and Africa; the Pacific, between America and Asia; the Indian, lying south of Asia, and limited on the east and west by Australasia and South Africa; the Arctic, surrounding the north pole; and the Antarctic, surrounding the south pole. There are articles on the several oceans, and the physical features and characteristics of the ocean will be described under SEA.

Oceania, a name sometimes given to the fifth division of the globe, comprising all the islands which intervene between the south-eastern shores of the continent of Asia and the western shores of America. It naturally divides itself into three great sections—the Malay Archipelago, Australasia or Melanesia, and Polynesia (q.v.).

Ocelot (*Felis pardalis*) is a species, with several varieties, which is confined to the New World, and ranges from Arkansas in the north to Patagonia. These animals are inhabitants of forests, and very expert in climbing trees. Their prey consists in great part of birds. They are beautifully marked and coloured. The coloration varies

Ocelot (*Felis pardalis*).

considerably, but the ground tint is always a rich red or tawny colour, blending finely with the dark brown on the margins of the open spots, of which there are chains along the sides; the head, neck, and legs being also variously spotted or barred with dark brown or black.

Ochil Hills, a pastoral range occupying parts of the Scottish counties of Stirling, Perth, and Clackmannan, and extending from the vicinity of Stirling north-east to the Firth of Tay. It is 24 miles in length, and about 12 in breadth. Chief summits are Bencleugh (2363 feet), Dunmyat (1375), and King's Seat (2111). The hills, which are formed chiefly of greenstone and basalt, contain silver, copper, and iron ores. See Beveridge's *Between the Ochils and the Forth* (1888).

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Ochino, BERNARDINO, Italian reformer, was born at Siena in 1487, and joined the Franciscan Observants, but in 1534 changed to the Capuchin order, as being more strict. In four years' time he was vicar-general of the order, having already before joining it gained the reputation of a man of great piety and eloquence. In 1542 he was summoned to Rome to answer to the Inquisition for certain evangelical tendencies which had been manifested in sermons delivered by him at Venice three years before, and had been much talked about. Warned by Cardinal Contarini, Ochino turned back at Bologna and fled to Geneva, where Calvin gave him a welcoming hand. In December 1545 he was appointed preacher to the Italian congregation in Augsburg, but fourteen months later was driven from the city by the advent of the imperial troops. From this time Ochino was dogged by misfortune, and was never able to stay long in any one place. He first found refuge in England, invited there by Cranmer; he was made pastor to the Italian exiles and given a prebend in Canterbury Cathedral. In England he wrote the *Tragedy*, a series of dramatic dialogues translated from the original Latin into English by Bishop Ponet, which is believed to have had some influence upon Milton's *Paradise Lost*. At Mary's accession (1553) Ochino fled to Switzerland, and ministered to the Italian exiles in Zurich for ten years. Then the publication of *Thirty Dialogues*, one of which the Calvinists stated to contain a defence of polygamy, occasioned his being banished precipitately from the canton. In the dialogue in question Ochino states expressly and repeatedly that 'polygamy is immoral;' but, being a man of inquiring, questioning intellect, he at the same time threw out the suggestion that there might be individual cases in which it might perhaps be permissible, provided the individual were quite certain he had God's approval. Ochino fled to Poland, but was soon driven thence by an edict directed against all foreigners, and died in flight at Schlackau in Moravia in the end of 1564. See Life by Benrath (Eng. trans. by Helen Zimmern, 1876).

Ochres are native pigments consisting of clays or earths composed chiefly of silica and alumina, along with oxide of iron or more rarely with other oxides. Some are found in a natural state fine enough to be used after being simply washed. The two important classes of ochres are the yellow and the red, the colouring material of the former being the hydrated oxide of iron, and that of the latter the red or sesquioxide. Umber (q.v.), which is classed with the ochres, contains manganese as well as oxide of iron. Yellow ochres are reddened by being burned. Most of the ochres can be prepared artificially, but these are not so safe for artists' purposes as the native earths. The latter are remarkable for their stability, as can be seen in many pictures by the old masters. Yellow ochre and Roman ochre are much used both by artists and house-painters, and so also (but the first more by artists) are the red ochres, known as light red, Indian red, and Venetian red. This last, however, is an artificial product, and, although it is an oxide of iron colour, it contains no earthy base, so that correctly speaking it is not an ochre. Ochre is found in several English counties, but it is most largely worked in Anglesey and Devonshire. About 12,000 tons are raised in some years, the value of which is roundly £2 per ton. It occurs in many other countries, there being large deposits of it in Canada. The earthy or powdery varieties of some of the less common metallic compounds found native are called ochres by mineralogists. Among these there are bismuth ochre, antimony ochre, nickel ochre, and chrome ochre.

Ochterlony, SIR DAVID, British general, was born of Scottish (Forfarshire) descent, at Boston, Massachusetts, on 12th February 1758, went out to India as a cadet at eighteen, and was made lieutenant-colonel in 1803. In the following year he defended Delhi against Holkar; but his greatest services were rendered against the Goorkhas. In 1814 he stormed their hill-forts one after the other, and compelled them to sue for peace; on the renewal of the war in 1815 he shut up their principal chief in the hill-fort of Malaun, forced it to surrender, and penetrated to within a few miles of the Nepalese capital. Peace was again made; and the treaty has remained in force down to the present time. Ochterlony was made (1816) a baronet for his success. He rendered excellent service in the Pindari and Mahratta wars of 1817 and 1818. He died at Meerut, 15th July 1825.

Ockham (more usually in the Latinised form OCCAM), WILLIAM OF, surnamed *Doctor Singularis et Invincibilis*, a famous 14th-century schoolman, was born in England, at Ockham in Surrey, but when is not known; the date usually given is 1270 or 1280. He entered the Franciscan order, and studied at Oxford and Paris, being a pupil, afterwards the rival, of Duns Scotus. It seems not to be correct that he took part in the contest between Philip the Fair of France and Boniface VIII., the famous *Disputatio super Potestate Prælatis Ecclesiæ . . . commissa*, usually attributed to him, having been probably written by another. But in the revolt of the Franciscans against Pope John XXII. at Perugia in 1322 he did take part, being one of the most active in the movement. After four months' imprisonment at Avignon he repaired to Munich, and found there a defender in the Emperor Louis of Bavaria, whom he in his turn defended stoutly against the temporal pretensions of the pope. In 1342 he seems to have become general of the Franciscans. Besides insisting on the independent divine right of temporal rulers, and so in some measure clearing the way for modern constitutional ideas, Ockham won greater fame as the reviver of Nominalism (q.v.), for which he won a final victory over the rival Realism, chiefly by setting forth its real meaning in plain and simple language. He seems to have died at Munich in 1349. His views on civil government are expounded in *Super Potestate Summi Pontificis octo Quæstionum Decisiones* (1339–42) and *Tractatus de Jurisdictione Imperatoris in Causis Matrimonialibus*, his philosophical views in *Summa Logices* (1488) and the commentary on the *Sentences* of Peter the Lombard, and his theological in this last and the *Tractatus de Sacramento Altaris* (1516). See T. M. Lindsay in *Brit. Quart. Review* (1872).

Ockley, SIMON (1678–1720), Orientalist, was educated at Oxford, and in 1711 became Arabic professor. His *History of the Saracens* (2 vols. 1708–18; long a standard, though not based on the best authorities) was partly written in a debtor's prison.

O'Connell, DANIEL, 'the Liberator,' greatest of Irish patriots and orators, was born near Cahirciveen in County Kerry, August 6, 1775. He was the eldest son of Morgan O'Connell, brother of the childless Maurice O'Connell, then head of an old Catholic family, whose chief seat was Darrynane Abbey. He was early adopted by his uncle, at whose house most of his boyhood was spent. He was placed, together with his brother, in January 1791 at the college of St Omer, the president of which, Dr Stapylton, foresaw his unusual promise. In August 1792 they went to the college at Douay, which was suppressed at the end of the year, and it was not without danger that the boys made their escape by Calais to England. To the end of his life O'Connell never forgot his glimpse of dominant

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revolution. He entered at Lincoln's Inn in 1794, worked hard, and was called to the Irish bar in May 1798. He was soon drawn, like most eager young Irishmen, into political agitation, and it appears probable that he had some connection with the conspiracy of 1798, the unhappy issue of which cured him for life of all love for secret societies. At the same time the scandalous scenes at state trials, the degraded condition of his co-religionists, and the shameful circumstances attending the Union already shaped for him the politics of his life. The average professional earnings of his first four years were only £180, but thereafter these rose rapidly. In 1802 he married his cousin, Mary O'Connell, who bore him five sons and three daughters, and with whom he lived till her death in 1836 in uninterrupted happiness. He joined the Munster circuit, and went on it for twenty-two years. He soon became famous as a counsel, as well as an unrivalled cross-examiner of Irish witnesses, and ere long was plunged in an enormous practice, amid which he yet contrived to find time for the convivialities of that day and for a large measure of political agitation. The wide popularity of 'the Counsellor'—to the last a favourite title among his Irish admirers—was due to his fearlessness and professional dexterity, his boisterous wit and good-humour, his constant tact and readiness in reply, and not less to the violent language he often employed in court, which he defended in later days as a necessary means to awaken the slumbering spirit and self-respect of Catholics. Their hopes, which had been raised by the pledges given at the Union, soon sank low, and O'Connell now flung himself into the agitation for their rights, quickly distanced Keogh and other timid leaders of the party, and by the beginning of 1811 stood out as its virtual chief.

Grattan's motion in favour of emancipation was carried in March 1813, but his bill was lost in committee. The 'securities' it proposed were most distasteful to the Catholic bishops, and O'Connell, ever a devoted churchman, supported them in their policy in opposition to Grattan. The timid counsels of the pope, then a pensioned prisoner of Napoleon, were displeasing to the Catholic party, but it was O'Connell's own conscientious convictions that nothing short of repeal would be permanently satisfactory that made him fight resolutely against all compromise. His attacks on the 'beggarly corporation' of Dublin, then an Orange stronghold, brought him a challenge from Mr J. N. D'Esterre, and in the duel that ensued his pistol unfortunately inflicted a fatal wound on his antagonist, February 1, 1815. O'Connell was filled with lifelong remorse; he settled a pension on the widow, and never till his latest day passed the dead man's house without uncovering his head and breathing a prayer. At the same time he registered a solemn vow never to go out again. His fiery invectives brought him in the course of his lifetime many challenges, but only once did he allow himself to accept another—from Peel in the September of 1815. The duel was only prevented by his being arrested on his wife's information and bound over to keep the peace. Meantime the Catholic cause languished; Grattan died in 1820, and Plunket took up his mantle, but again the Lords threw out the bill. The visit of George IV. to Ireland in August 1821 raised hopes only to be nipped in the bud, while famine and commercial insecurity paralysed the public confidence. In 1823, at the moment of deepest gloom, O'Connell formed on a broad and popular basis the Catholic Association, and before the end of the year had brought the priests into it. At first they showed much disinclination to join in the agitation, preferring the old policy of 'dignified silence;' but, once they entered heartily into it, the movement became for the first time really national and irresistible. The Association was a gigantic system of organisation, perfectly new to Ireland, and aroused the greatest enthusiasm from sea to sea. By the 'Catholic Rent' a large sum of money was raised for its purposes, a penny a month not being too little as a test of membership. By the end of 1824 it had grown to a formidable power, the average weekly rent for its last three months being as much as £500. The government in alarm brought in a bill to suppress the Association, but it dissolved itself, March 18, 1825. The Irish forty-shilling freeholders now began to find courage to oppose their landlords at the elections. Waterford was carried in 1826, and O'Connell himself stood for Clare in 1828, and was carried amid enormous enthusiasm, yet perfect order. The Clare election set the whole country aflame; the lord-lieutenant, Lord Anglesey, foreboded insurrection, and even the Iron Duke was appalled at the prospect; but O'Connell saw that an outbreak would ruin the Catholic cause on the very eve of its triumph, and with magical effect ended the agitation. In 1829 the measure of relief passed at last, admitting Catholics to parliament, repealing the oath of abjuration, and modifying that of supremacy, the 'securities' being the abolition of the forty-shilling franchise and raising the qualification to £10. On the 15th May 1829 O'Connell came to take his seat, and was heard at the bar as to his right to escape the old oaths. He spoke calmly and admirably, but the House refused his claim by 190 to 46. He went down to Clare like a conqueror, was returned unopposed, and took his seat at the beginning of 1830, then fifty-five years old. At the new election on the king's death he was returned for Waterford.

Much of the good effect of 1829 was lost by the unnecessary insult to a sensitive people of not allowing its champion to take his seat without re-election, still more by the fact that no Catholics were appointed to the bench, and by the placing in the hands of the lord-lieutenant the power to suppress arbitrarily by proclamation any assembly that seemed to him dangerous. O'Connell now formed a new society for Repeal, 'The Friends of Ireland of all Religious Persuasions,' which was quickly suppressed, only to be revived as often as suppressed by a succession of others under new names and forms so as to elude the letter of the law. He denounced the ministry of Wellington and Peel, and tried in 1830 to embarrass them by an unjustifiable letter recommending a run upon gold. In the face of the threatened prosecution against him in 1831 he temporised and so saved himself. In the same year he became King's Counsel, the honour having been kept back as long as possible. It was at this period that he declined the challenge of Hardinge, the chief-secretary. Liberal in every part of his imperial policy, during the Reform struggle he supported the Whigs, as later he advocated free trade in corn, negro emancipation, the removal of the disabilities of the Jews, the cause of Poland, not to speak of universal suffrage, and the drastic reformation of the House of Lords. In the autumn of 1830 the potato crop had been very poor, and much misery was the result in Ireland. Under O'Connell's advice the people declined to pay tithes, and that winter disorder was rampant everywhere.

He had sat last for Kerry, when at the general election of 1832 he was returned for Dublin. At this time he nominated about half of the candidates returned, while three of his sons and two of his sons-in-law composed his 'household brigade.' Of the 105 Irish members but 23 were Tories; while of the 82 Liberals as many as 45—his famous 'tail'—were declared Repealers. The severest of all

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coercion acts hitherto in force was that of 1833, against which O'Connell fought in the House of Commons with masterly courage and ability. The disgraceful interruptions and outrageous insults of his opponents somewhat excuse the violence of his tone and the vulgarity of such phrases as 'beastly bellowings,' till then, if not since, unfamiliar to the ears of the House of Commons. Soon after this he was forced against his better judgment by Feargus O'Connor, the *Freeman's Journal*, and his more ardent followers to bring the Repeal movement prematurely into parliament. On April 22, 1834, he spoke nearly seven hours for a committee to inquire into the Act of Union. The debate lasted nine nights, and the motion was defeated by 523 to 38. The Whigs under Lord Melbourne came into power in 1835, and, Repeal being for the time set aside as hopeless, O'Connell would have accepted office had not the king intervened to forbid it, and certainly for the next five years he gave the Whigs a steady support. His phrase 'a bloated buffoon,' applied to Lord Alvanley, brought a challenge which was refused, but his son Morgan went out in his stead, and two shots were fired. D'Israeli, who had solicited O'Connell's help in his canvass for High Wycombe in 1832, now attacked him fiercely at the Taunton election in 1835. In a speech at Dublin O'Connell retorted by calling him 'a miscreant,' 'a liar,' 'a disgrace to his species,' and 'heir-at-law of the blasphemous thief who died upon the cross.' D'Israeli now sought to earn a cheap reputation as a fire-eater by challenging Morgan O'Connell in his father's stead, but the challenge was declined. That year O'Connell visited the north of England and Scotland, received everywhere by enormous crowds full of curiosity and interest. An incident in the Carlow election of 1835 brought upon him from unscrupulous and watchful enemies the charge of having pocketed money to procure a man a seat, but the inquiry only brought out that he was grossly careless in managing affairs, and left no real stigma on his character. One of the most common Tory slanders upon him was that Repeal was not so much the object of 'the big Beggarman' as the Repeal rent; but it must be remembered that to serve his country he surrendered a very lucrative practice at the bar (worth £7000 a year, as he told the House of Commons) and all hope of professional promotion, that though as much as £10,000 of tribute flowed yearly into his hands he expended it faithfully in the cause, and, in spite of the large fortune bequeathed by his uncle in 1825 and a subscription of £50,000 in 1829, died worth scarcely a thousand pounds. The vast hospitality he exercised was a necessity of his position, and, if it is true that he brought his own sons into parliament, it cannot be said that he ever set aside a really good candidate in their favour. Ireland trusted him, and to the end he justified her trust.

Mulgrave and Drummond governed Ireland so mildly and impartially that O'Connell was prepared to abandon the Repeal agitation in the prospect of at last obtaining justice for his country. In 1836 he was unseated on petition for Dublin—his expenses in defending were £20,000; those of the petitioners, £40,000. He was now returned for Kilkenny, nearly £8500 being at once raised for his expenses. He had loyally supported the Whigs at the risk of waning popularity in Ireland, but he began to feel misgivings as he saw his dreams of justice to Ireland vanishing into a more and more distant future. In the November of 1837 he denounced the men in a Dublin strike and was hooted at in the streets, and on 28th February 1838 he was severely reprimanded by the Speaker for attributing perjury to the Tory committees in the House of Commons. That same year the Mastership of the Rolls was offered him but declined. In August he founded his 'Precursor Society,' and on April 15, 1840, his famous Repeal Association, the members of which were grouped in three classes—volunteers who subscribed or collected £10 a year, members who subscribed £1, and associates who subscribed one shilling. That summer and autumn he addressed meetings incessantly, but yet the agitation languished till the appearance of the *Nation* in October 1842 brought him the aid of Dillon, Duffy, Davis, Mangan, and Daunt. In 1841 O'Connell lost his seat at Dublin, but found another at Cork, and in November he was elected Lord Mayor of Dublin. On February 25, 1843 he brought up the question of Repeal in the Dublin corporation in a splendid oration of four hours' length, and carried it against Isaac Butt by 41 to 15. The agitation now leaped into prominence, and the priests came pouring in to swell its strength. That year's rent was £48,400; Conciliation Hall was built in Dublin, and a magnificent and perfect organisation arranged with great enthusiasm and perfect harmony. Even a Repeal police was instituted under a Head Pacificator. Arbitration courts were formed, and a great mass of national literature disseminated. O'Connell travelled that same year 5000 miles. Monster meetings, attended by hundreds of thousands, were held in every corner of Ireland, yet these were never mobs—nowhere was there crime or even drunkenness, thanks to Father Mathew. The greatest was that held on the Hill of Tara, 15th August 1843, the attendance at which was estimated by the *Nation* at three-quarters of a million. O'Connell had an innate horror of rebellion and bloodshed—'he who commits a crime adds strength to the enemy' was a favourite motto; another, 'no political change whatsoever is worth the shedding of a single drop of human blood.' Throughout a whole generation with wonderful skill he had kept the public mind at a pitch of the highest political excitement, yet restrained it from unconstitutional action, although he often skated dangerously near the edge of inflammatory language. But now the Young Ireland party, with all the infallibility of youth and enthusiasm, began to grow impatient of the old chief's tactics, and, impelled by their enthusiasm and certain of the speedy surrender of the government, O'Connell allowed himself in his speeches to outrun his better judgment. But this time Wellington was resolute in his measures, and poured 35,000 men into Ireland. A great meeting was fixed at Clontarf for Sunday, October 5, 1843, but it was proclaimed the day before. O'Connell, apprehensive of a bloody scene, issued a counter-proclamation abandoning the meeting. Early in 1844 he was tried with his son and five of his chief supporters for a conspiracy to raise sedition, and after a trial extending over twenty-three days was found guilty, and ultimately on May 30 sentenced to twelve months' imprisonment, a fine of £2000, and £5000 security for good behaviour for seven years. The House of Lords set aside the verdict as erroneous on September 4, and at once bonfires blazed across Ireland from sea to sea. But during the fourteen weeks the Tribune lay in prison the disease seized him of which three years later he was to die. And he found that in his absence the Young Ireland party had taken a forward step, and that his moral force policy was now discredited by the more fiery young spirits of his party, who began to talk in articles and songs of the lawfulness of physical resistance to the government. His proposed scheme of federation and local parliaments found no favour, and he withdrew it, alleging that it was merely a ruse to gauge the Whig feeling of Ulster. He opposed Peel's provincial 'godless colleges,' and soon came an open split between him and Young Ireland, the members

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of which seceded from the Association after angry disputes in 1846. Next followed the potato famine. Distraction at the sufferings of his country, dismay at the stalking shadow of famine, vexation at the breach in his party, consciousness of failure in the dearest project of his life, religious austerities in expiation of the errors of his youth, the progress of insidious disease, and last of all a crazy passion for a young English girl, now combined to break down his herculean frame. He left Ireland for the last time on 26th January 1847, made a touching but scarce audible speech in the House of Commons on February 8, next went to Hastings and to Folkestone, and as he felt the hand of death upon him was filled with a great longing to reach Rome. Boulogne, Paris, Moulins, Lyons, Marseilles, and Genoa were the slow stages of the journey. At the last, after some days of delirium, he died, May 15, 1847. His heart by his own desire was carried to Rome, and buried in the church of St Agatha; his body rests in the Glasnevin Cemetery, Dublin, in a crypt at the base of an Irish round tower, 165 feet high.

Daniel O'Connell was framed by nature for the part he had to play in life. Almost six feet high, of burly figure, giant strength, inexhaustible energy, and enormous powers of work, he had a splendid command of nervous language, and a mighty voice that rose high above the uproar of the crowd. A magnificent orator, trenchant, versatile, self-possessed, sincere with all his exaggeration, ready in unstudied and effective retort, richly endowed with a coarse but genuine humour, and ever thoroughly Irish, he controlled at will the wildest emotions of an Irish mob, and passed with the ease of a master from bursts of passion and outrageous buffoonery to the tenderest pathos. He was master of all the artillery of vituperation, but it should be remembered in his defence that he was assailed all his life, the constant victim of a malignity and hatred now difficult to realise. Even the *Times* newspaper stigmatised him as 'an unredeemed and unredeemable scoundrel,' and asked, like Cicero of another Catiline, 'How long shall such a wretch be tolerated among civilised men?' Yet O'Connell was no demagogue in the unworthy sense of that word, no socialist or advocate of strikes—he opposed the poor-laws of 1838 on the most unpopular grounds, and rejected the proffered alliance of the Chartists, constantly denounced rebellion, and was unswerving in personal loyalty to the sovereign. He was no mere tool of Rome, and never abused Protestants as such, but advocated a large tolerance in religion far beyond the ideas of either his antagonists or his supporters, making for his aim a really Liberal Catholicism that earned the unstinted approbation of Montalembert and Lacordaire. His church policy was carried out far beyond his dreams in 1869, his fixity of tenure granted by the Land Bill of 1870; and indeed the magnitude of the measures the imperial parliament has since his time adopted to heal the distresses of Ireland but shows how sound was his statesmanship and how real were the evils that he denounced. Yet together with all this good there was mixed much evil also. He was coarse, scurrilous, cunning, violent, bombastic, unscrupulous, more than Celtic in his looseness of phrase and exaggeration, he often played upon unworthy passions, and left behind him an inheritance of antagonism between classes in Ireland that has done much to degrade and embitter the tone of public life. But it should never be forgotten that he taught his country to manage within constitutional limits the whole machinery of political agitation, and again aroused within her the spirit of nationality and the instinct of freedom. He said himself with justifiable pride, 'Grattan sat by the cradle of his country, and followed her hearse: it was left for me to sound the resurrection trumpet, and to show that she was not dead, but sleeping.' With all his faults he was a great and sincere patriot, whose devotion to the best interests of Ireland will never fade from her remembrance.

Of O'Connell's published writings the most characteristic is the *Letter to the Earl of Shrewsbury* (1842). His *Memoir of Ireland, Native and Saxon* (1843), never saw its second volume, and is poor and inaccurate. There is no adequate biography, though there are Lives by his son John O'Connell (1846), William Fagan (1847-48), M. F. Cusack (1872), and a short Centenary Life by the Rev. John O'Rourke (1875). See W. J. O'Neill Daunt's *Personal Recollections* (2 vols. 1848); his son's *Recollections and Experiences during a Parliamentary Career from 1833 to 1848* (2 vols. 1849); W. E. H. Lecky's *Leaders of Public Opinion in Ireland*, unquestionably the ablest estimate of his character (new ed. 1871); M. F. Cusack's *Speeches and Public Letters of the Liberator* (2 vols. 1875); Shaw Lefevre's *Peel and O'Connell* (1887); the excellent study by J. A. Hamilton in the 'Statesmen' series (1888); and W. J. Fitzpatrick's authoritative and invaluable *Correspondence of Daniel O'Connell, the Liberator* (2 vols. 1888). The delightful letters to his wife and Archbishop M'Hale, contained in the last, gave a new revelation into his character. Good articles on O'Connell are those by J. Ball in *Macmillan's Magazine* for July 1873, and Mr Gladstone in the *Nineteenth Century* for January 1889.

O'Connor, FEARGUS EDWARD, Chartist, was born in 1796, and was educated at Portarlington and Trinity College, Dublin. He was called to the Irish bar, and entered parliament for Cork in 1832. At first a supporter of O'Connell, he became estranged from his leader, and devoted himself to the cause of the working-classes in England. His great stature and strength, his eloquence and enthusiasm, gave him vast popularity as a leader, and by his paper, the *Northern Star*, he did much to advance the cause of Chartism. Elected for Nottingham in 1847, he presented the monster petition in the April of the following year. In 1852 he was found to be hopelessly insane, and in 1855 he died.

Oconto, capital of Oconto county, Wisconsin, on Green Bay, at the mouth of the Oconto River, 149 miles by rail N. of Milwaukee. It has large steam sawmills, and exports pine lumber. Pop. (1885) 4880.

Octave (Lat. *octavus*, 'eighth'), in the church calendar, is the eighth day after a festival, counting in the festival day itself; also, the week after a church festival.—In Music octave is the interval between any musical note and its most perfect concord, which is double its pitch, and occupies the position of the eighth note from it on the diatonic scale. The name octave is often given to the eighth note itself as well as to the interval.

Octavia, the sister of the Roman emperor Augustus, and wife of Mark Antony, distinguished for her beauty, her noble disposition, and womanly virtues. On the death of her first husband, Marcellus, she consented in 40 B.C. to marry Antony, to make secure the reconciliation between him and her brother; but in a few years Antony forsook her for Cleopatra. In 32 B.C. war, long inevitable, broke out between Antony and Octavian; and the former crowned his insults by sending Octavia a bill of divorcement. But no injury was too great to be forgiven by this patient Griselda of the ancient world; and after her husband's death she brought up with maternal care not only her own children by Antony, but also those of Cleopatra. She died 11 B.C.

Octavian. See AUGUSTUS.

October (Lat. *octo*, 'eight') was the eighth month of the so-called year of Romulus, but became the tenth when Numa changed the commencement

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of the year to the first of January, though it retained its original name, notwithstanding the attempts made by the Roman senate, and the emperors Commodus and Domitian, who substituted for a time the terms Faustinus, Invictus, Domitianus. Many Roman and Greek festivals fell to be celebrated in this month, the most remarkable of which was the sacrifice at Rome of the October horse to the god Mars.

Oc'topus, a widely distributed genus of eight-armed cuttle-fishes, the members of which (e.g. *O. vulgaris* in Europe, and *O. bairdii* in America) usually live near shore, lurking among the rocks, preying upon crustaceans and molluscs. The term is often extended to related genera, such as Eledone, and to other members of the sub-order Octopoda. These differ in many ways from the Decapoda, such as Sepia and Loligo: thus, the suckers on the eight arms are sessile and without a horny ring; the body is more rounded, and there is no internal residue of a shell. Of the half-hundred species some are large: thus, *O. vulgaris* may have tentacles about 8 feet long, and *O. punctatus* of the Pacific coasts even twice as much. These are dwarfed, however, by the gigantic ten-armed Architeuthis, of which one specimen exhibited in America had a head and body 9½ feet long and arms of 30 feet, while another had a body twice as big.

Common Octopus (*Octopus vulgaris*).

Many fanciful descriptions have been given of the Octopus, notably that by Victor Hugo in his *Toilers of the Sea*, in which the characters of cephalopod and polyp are dramatically combined. Large specimens may of course act powerfully on the defensive, but by nature they are timid, lurking animals, the conger eel and other voracious fishes being their most formidable foes. They are sometimes caught in sunken pots, into which they creep, and the flesh is used both as food and bait. The predominant colour is reddish, but it changes rapidly with that of the surroundings and with the temper of the animal, which has also the power of discolouring the water by a discharge of inky fluid. The eggs are enclosed in small translucent sacs, and hundreds are attached to a common stalk which is glued to the rock, and protected and kept free of small seaweeds, &c., by the female. For their general structure, see CEPHALOPODA, CALAMARY, and CUTTLE-FISH.

Octroi (Lat. *auctoritas*, 'authority'), a term which originally meant any ordinance authorised by the sovereign, and thence came to be restrictively applied to a toll or tax in kind levied from a very early period in France and other countries of northern Europe on articles of food which passed the barrier or entrance of a town. The octroi was abolished in France at the Revolution, but in 1798 it was re-established. The octroi officers are entitled to search all carriages and individuals entering the gates of a town. Similar taxes are raised in Italy and elsewhere.

O'Curry, EUGENE (1796–1862), Irish antiquary. See IRELAND, Vol. VI. p. 209.

Od, the name given by Baron Reichenbach (q.v.) to a peculiar physical force which he thought he had discovered, intermediate between electricity, magnetism, warmth, and light. This force, according to him, pervades all nature, and manifests itself as a flickering flame or luminous appearance at the poles of magnets, at the poles of crystals, and wherever chemical action is going on. All motion generates od; and all the phenomena of mesmerism are ascribed to the workings of this od-force. See Buchner, *Das Od* (1854); Fechner, *Erinnerungen an die letzten Tage des Odlehre* (1876); and the *Transactions* of the Psychical Research Soc. (1883).

Odal. See ALLODIUM.

Oddfellows. See FRIENDLY SOCIETIES.

Ode (Gr. *ōdē*, from *aeidō*, 'I sing'), a form of lyrical poetry associated in its supreme form with the name of Pindar, but practised with splendid success by many English poets. The Greek ode was simply a chant or poem arranged to be sung to an instrumental accompaniment, and all the variations of form that occurred were merely subjective, incapable of imitation, and conditioned only by the exigencies of the music. Archilochus was the first to expand the simple distich into an *epode;* Alcman, to adopt the more complex form of the *carmen* or ode. Sappho, Alcæus, and Anacreon carried it further, and shaped the lighter form of ode known to us, through the masterpieces of their greatest imitator, as the Horatian. Stesichorus modified the ode of Alcman by elaborating a triple movement, in which the metrical wave moving in the *strophe* was answered by the counter-wave moving in the *antistrophe*, the whole concluded by the *epode*, a blended echo of the two. Simonides adapted this elaborate form to Dorian music, and next followed Pindar, the greatest master of the ode. His *Parthenia* or odes for virgins, his *Skolia* or dithyrambic odes in praise of Dionysus, and his encomiastic odes have all perished; only his *Epinikia*, or triumphal odes, remain. These display an infinite variety of metrical ingenuity; no two odes have the same metrical structure, yet each obeys a definite structural law, and license there is none in its irregularity. The Humanist poets imitated the simpler Ætolian measures as they found them in Catullus and Horace; but many of our poets, taking Pindaric as synonymous with irregular, produced so-called odes whose only likeness to their great original was their 'unshackled numbers.' But irregularity in verse is not allowable except in cases where it is a natural aid grasped by the poetic mood in its moment of exaltation; for the most constant charm of poetry is the inevitableness of cadence, which must never be lightly flung away unless to subserve another and still higher law—that of emotional necessity. It is only in the hands of a master that the ode may safely be imitated in English; by all others the apparent artifice of the form and the necessary spontaneity of the impulse may not be reconciled.

Ben Jonson's odes are unequal; Herrick's, poor; Spenser's *Epithalamium*, or marriage ode, is one of the most splendid triumphs of English poetry; and

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Milton, in his magnificent poem, *On the Morning of Christ's Nativity*, found in this a form adequate for that poetic exaltation which was his habitual mood. Cowley was already an expert in the Horatian ode, when he fell in with Pindar, and imitated him, in externals at least, in a number of elaborate compositions, usually redeemed from dullness by bursts of undoubted poetic power. Dryden has left at least three immortal odes, *To Mistress Anne Killigrew*, *For St Cecilia's Day*, and *Alexander's Feast;* and Congreve wrote not only a few admirable, if formal, examples, but an excellent critical *Discourse on the Pindarique Ode* (1705). The matchless Orinda, Lord Orrery, Ambrose Philips, Young, Akenside, and Shadwell followed after their kind; and Gray, first drawn to this form by Gilbert West, translator of Pindar, produced in 1754 and 1756 his two inimitable Pindaric odes, the *Progress of Poesy* and *The Bard*. The exquisitely poetic, though not Pindaric, odes of Collins were given to the world somewhat earlier. Wordsworth, Coleridge, Shelley, Keats, and Tennyson poured some of their noblest verse into this form, while modifying it further, whether as *regular*—i.e. following a definite arrangement in stanzas, or as *irregular*, following no such arrangement. There are no finer odes or nobler poems in our language than Coleridge's odes *To the Departing Year* and *To France;* Wordsworth's *To Duty* and *Intimations of Immortality from Recollections of Early Childhood;* Shelley's *To the West Wind*, *To a Skylark*, *To Liberty*, and *To Naples;* Keats's odes *To a Nightingale*, *On a Grecian Urn*, and *To Autumn;* Tennyson's funeral ode *On the Death of the Duke of Wellington;* and Swinburne's *To Victor Hugo in Exile*.

See *English Odes* (1881), admirably selected by Edmund W. Gosse, with an excellent introduction; and the subtle and suggestive article 'Poetry,' by Theodore Watts, in vol. xix. (1885) of the *Encyclopædia Britannica*.

Odense, the chief town of the Danish island of Fünen (q.v.). Its cathedral was founded in 1086; and diets were held here in 1527 and 1539. Pop. (1880) 20,804; (1890) 30,277.

Odenwald, a mountainous system partly in Baden and Bavaria, but mainly in Hesse (q.v.).

Oder (Lat. *Viadrus*, Slavon. *Vjodr*), one of the principal rivers of Germany, rises in the Oderberg on the tableland of Moravia, 1950 feet above the level of the sea, traverses Prussian Silesia, Brandenburg, and Pomerania, then empties itself into the Stettiner Haff, whence it passes into the Baltic by the triple arms of the Dievenow, Peene, and Swine, which enclose the islands of Wollin and Usedom. It has a course north-west and north of 550 miles, and a basin of 50,000 sq. m. The rapid flow, induced by its very considerable fall, together with the silting at the embouchures of the numerous tributaries, renders the navigation difficult; great expense and labour being, moreover, necessary to keep the embankments in order, and prevent the overflowing of the river. Canals connect the Oder with the Spree, the Havel, and the Elbe; the Warthe is the only tributary of importance for navigation. On the banks of the Oder are Ratibor (where it is navigable for barges), Brieg, Breslau, Frankfort-on-the-Oder, Stettin, and Swinemünde.

Odescalchi. See INNOCENT XI.

Odessa, in point of population the fourth city of Russia, stands on the shore of the Black Sea, about midway between the estuaries of the Dniester (25 miles to the south-west) and the Dnieper, 90 miles north-east of the Danube mouth, and by rail 967 miles from Moscow and 381 from Kieff. The city is built facing the sea on low cliffs, seamed with deep ravines and hollowed out by galleries in the soft rock, in which numbers of the poorest inhabitants herd together. Above ground its streets are long and broad, and cross each other at right angles. Odessa was only founded in 1794, near a Turkish fort that fell into Russian hands in 1789; but it quickly became the principal export town for the extensive corn-growing districts of South Russia. Its progress was greatly aided by its being declared a free port from 1817 to 1857, and again by the construction of the railway to Kieff in 1866. The population has increased rapidly, from 3150 in 1796 to 25,000 in 1814, 100,000 in 1850, 184,800 in 1873, and 270,600 in 1887. Close upon 70,000 of these were Jews, dividing with the Greeks most of the trade. Merchants of many other nationalities dwell here also, especially from the countries round the Black Sea. The harbour is made up of a roadstead and three basins, protected by moles against the dangerous winds that sweep the Black Sea. It is impeded by ice—scarcely ever closed by it—during an average of only a fortnight in the year. The bulk of the exports consists of grain, principally wheat; the total quantity of grain sent abroad in 1889 was valued at £10,889,062, wheat alone being estimated at £7,497,000. The figures for wheat fluctuate, however, between the last-quoted sum and £2,209,000 (1886). The value of the gross exports has steadily increased, doubling between 1886, when the figure was £8,279,900, and 1889, when it reached £16,787,700. Sugar (£1,217,400 in 1889), wool, and flour are the remaining chief items of export. The imports (raw cotton, oils, groceries, iron and steel, coal, food-stuffs, fruits, tea, tobacco, machinery) average £3,856,500 (five years from 1885). An average of 1295 vessels of 1,370,256 tons enter the port every year, an average of 716 of these vessels, with a tonnage of 1,180,245, being British, the Russian tonnage being only one-fifth of this. But the Russians carry on a large and increasing coasting trade. The chief branches of industrial activity are flour-milling, sugar and oil refining, and, in a secondary degree, the manufacture of tobacco, machinery, leather, soap, chemicals, biscuits, &c. Odessa has a university (1865) with close upon 600 students, and the usual cabinets and collections; a great number of schools, including a cadet, a commercial, and two music schools; several learned societies, and a public library (1829) of 40,000 vols., many of them rare. The museum of the Historical and Antiquarian Society contains treasures from the coasts of the Black Sea, belonging to the Hellenic, the Veneto-Genoese, and the Tartaro-Mongol civilisations. Amongst the public buildings of Odessa we mention the cathedral (1802–49), which is the church of the Archbishop of Kherson, three dozen other churches, a very fine opera-house (1887), palatial grain-warehouses, corn-elevators, and the 'palais royal,' which, with its gardens and park, is a favourite place of resort. Monuments to Count Worontsoff (1863), the Duke de Richelieu (1827)—both great benefactors of Odessa—and Pushkin (1889) adorn the city. Water is brought by aqueduct (27 miles long) from the Dniester. Numerous coast batteries have been built since 1876 to prevent a recurrence of bombardment, such as happened when the British fleet sailed past the city in April 1854. Odessa has an unenviable notoriety as a home of the cholera, for its persecution of the Jews, and for its Nihilist sympathies.

Odeypoor. See UDAIPUR.

Odilon-Barrot. See BARROT.

Odin (*Odhinn;* O. H. Ger. *Wuotan;* Saxon, *Wodan*, or *Woden*—whence *Wednesday*), the chief god of northern mythology, common to all Germanic peoples. He is not the creator of the world, but its ruler, king of heaven and earth. Odin, as

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the highest of the gods, the *Alfadur*, rules heaven and earth, and is omniscient. As ruler of heaven, his seat is the palace Hlidskialf in Asgard, from whence his two black ravens, Hugin (Thought) and Munin (Memory), fly forth daily to gather tidings of all that is being done throughout the world. As god of war, he holds his court in Valhalla, whither come all brave warriors after death to revel in the tumultuous joys in which they took most pleasure while on earth. His greatest treasures are his eight-footed steed Sleipner, his spear Gungner, and his ring Draupner. As the concentration and source of all greatness, excellence, and activity Odin bears numerous different names. By drinking from Mimir's fountain he became the wisest of gods and men, but he purchased the distinction at the cost of one eye. He is the greatest of sorcerers, and imparts a knowledge of his wondrous arts to his favourites. Frigga (q.v.) is his queen, and the mother of Balder (q.v.), the Scandinavian Apollo; but he has other wives and favourites, and a numerous progeny of sons and daughters. He is claimed as ancestor of various royal dynasties. Rhys contends that the myths relating to Woden, the great Teutonic sky-god, may be traced to a Celtic origin, and compares the name Woden with the Celtic Gwydion. See SCANDINAVIAN MYTHOLOGY.

Odoacer, ODOVACAR, the ruler of Italy from the year 476 to 493, was the son of Ædico, a captain of the Germanic Scyrri. He entered the military service of the western Roman empire, and rapidly rose to eminence. He took part in the revolution by which Orestes (475) drove the Emperor Julius Nepos from the throne, and conferred on his son Romulus the title of Augustus, which the people scoffingly changed into Augustulus. He soon perceived the weakness of the new ruler, and at the head of the Germanic mercenaries—Herulians, Rugians, Turcilingians, and Scyrri—marched against Pavia, which Orestes had garrisoned, stormed the city, and put his opponent to death (476). Romulus abdicated, and withdrew into obscurity. Thus perished the Roman empire. Odoacer showed himself to be a wise, moderate, and politic ruler, sought to conciliate the Byzantine emperor Zeno, and, with the title of *Patricius*, ruled Italy from Ravenna. The barbarian ruler did everything in his power to lift Italy out of the deplorable condition into which she had sunk. Though an Arian himself, he acted with a kingly impartiality that more orthodox monarchs have rarely exhibited. He conducted a successful campaign in Dalmatia, and against the Rugii on the Danube. The increasing power of Odoacer excited the jealousy and alarm of Zeno, who encouraged Theoderic, king of the Ostrogoths, to undertake an expedition against Italy (489). Odoacer, defeated in three great battles (at Isonzo, at Verona, and on the Adda), shut himself up in Ravenna, which he bravely defended for three years. Compelled by famine, he capitulated (493) on condition that the kingdom of Italy should be shared between him and Theoderic; but a fortnight after Odoacer was assassinated at a feast by Theoderic himself. See Hodgkin, *Italy and her Invaders*.

Odometer. See PEDOMETER.

O'Donnell, LEOPOLD, Marshal of Spain, born at Teneriffe, 12th January 1809, was descended from an ancient Irish family. He entered the Spanish army when young, and espoused the cause of the infant Queen Isabella against Don Carlos (see CARLISTS). When the Carlists were overthrown he was created Chief of the Staff to Espartero. He took the side of the queen-mother in 1840, emigrated with her to France, and took up his residence at Orleans, where he planned many of the political risings which took place under the rule of Espartero. In 1843 his intrigues against Espartero (q.v.) were successful; and he was rewarded by the governor-generalship of Cuba, where he amassed a large fortune by favouring the iniquitous trade in slaves. When he returned to Spain (1848) he intrigued against Bravo Murillo and Narvaez; was made war minister by Espartero in 1854; but plotted against his benefactor, and in 1856 supplanted him by a *coup d'état*. He was in three months' time succeeded by Narvaez, but in 1858 he returned to power; in 1859 he commanded the army in Morocco, and after a tedious campaign took the Moorish camp, and the city of Tetuan surrendered, whereupon he was made Duke of Tetuan. In 1866 his cabinet was upset by Narvaez, and he died at Bayonne, 5th November 1867.

Odontopteryx (Gr. *odous*, 'a tooth;' *pteryx*, 'a wing'), a goose-like or duck-like bird, the remains of which occur in the London clay (see EOCENE SYSTEM). The alveolar margins of both jaws are furnished with tooth-like denticulations, which are actual parts of the bony substance itself, and, therefore, not like true teeth. The tooth-like serrations, of two sizes, are of triangular or compressed conical form, and are all directed forwards.

Odontornithes, extinct toothed birds from the Cretaceous strata of North America. There are two distinct types—Ichthyornis and Hesperornis. The former and its relative Apatornis were small tern-like flying birds, with teeth in sockets, and with biconcave vertebræ. But Hesperornis was a large bird, about six feet long, with utterly degenerate wings and obviously incapable of flight. According to Marsh, to whom our knowledge of these forms is chiefly due, it was a consummate diver, even more aquatic than the penguin. The teeth are set in grooves, the vertebræ saddle-shaped. 'A bird indeed,' Stejneger says, 'but a kind of swimming, loon-like raptorial ostrich, without fore-limbs, with the gape armed with formidable rows of strong teeth like a gigantic lizard, and with a large, broad, and flattened tail like a beaver.' See Marsh's monograph (1880).

Œcolampadius, JOANNES (the Latin form of HAUSSCHEIN, although his proper name was Hussgen), one of the most eminent of the coadjutors of Zwingli in the Swiss Reformation, born in 1482 at Weinsberg, in Swabia. He relinquished the study of law at Bologna for that of theology at Heidelberg, became tutor to the sons of the Elector Palatine, and subsequently preacher in Weinsberg. Being appointed preacher at Basel, he formed the acquaintance of Erasmus, who employed him as assistant in his edition of the New Testament. In 1516 he left Basel for Augsburg, where also he filled the office of preacher, and where he entered into a convent. But Luther's publications exercised so great an influence on him that he left the convent, and became chaplain to Franz von Sickingen, after whose death he returned to Basel in 1522, and, in the capacity of preacher and professor of Theology, commenced his career as a reformer. He held disputations with supporters of the Church of Rome in Baden in 1526, and in Bern in 1528. In the controversy concerning the Lord's Supper he gradually adopted more and more the views of Zwingli. In 1529 he disputed with Luther in the conference at Marburg, and he wrote several treatises. He died at Basel, 24th November 1531. He was remarkable for his gentleness of character. There are Lives in German by Herzog (1843) and Hagenbach (1859).

Œcumenical. See ECUMENICAL.

Œde'ma (Gr., 'a swelling') is the term applied in medicine to the swelling occasioned by the effu-

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sion or infiltration of serum into cellular or areolar structures. The subcutaneous cellular tissue is the most common seat of this affection. Œdema is not a disease, but a symptom, and often a symptom indicating great danger to life. The means of removing it must be directed to the morbid condition or cause of which it is the symptom.

Oedenburg (Hung. *Soprony*), a town of Hungary, situated in an extensive plain, 3 miles W. of the Neusiedler See and 48 S. by E. of Vienna. It is one of the most beautiful towns in Hungary, and has manufactures of candied fruits, sugar, soap, &c., with a large trade in wine, corn, and cattle, the neighbourhood being rich and well cultivated. The Roman town of *Scarabantia* here was one of considerable importance; and numerous Roman remains have been found. Pop. 22,322.

Œdipus (Gr. *Oidipous*), the hero of a legend which supplied subjects for some of the noblest tragedies of Sophocles and Euripides. Œdipus was the son of Laius, king of Thebes, by Jocasta, the sister of Creon, and was exposed after his birth, with his feet pierced through, on Mount Cithæron, because his father had learned from an oracle that he was doomed to perish by the hands of his own son. The child was discovered by a herdsman of Polybus, king of Corinth, and was named Œdipus from his swollen feet. Polybus brought him up as his own son. Being told by the oracle at Delphi that he was destined to slay his father and commit incest with his mother, he would not return to Corinth, but proceeded to Thebes to escape his fate. As he drew near he met the chariot of the king, and the charioteer ordering him out of the way, a quarrel ensued, in which Œdipus unwittingly slew Laius. In the meantime the famous Sphinx had appeared near Thebes, and propounded a riddle to every one who passed by, putting to death all who failed to solve it. In the terror of despair the Thebans offered the kingdom, together with the hand of the queen, to whoever should deliver them from the monster. Œdipus offered himself, whereupon the Sphinx asked him, 'What being has four feet, two feet, and three feet; only one voice; but whose feet vary, and when it has most, is weakest?' Œdipus replied that it was man, whereat the Sphinx threw herself headlong from the rock on which she sat. Œdipus became king, and husband of his mother, Jocasta. From their incestuous union sprung Eteocles, Polynices, Antigone, and Ismene. A mysterious plague now devastated the country, and, when the oracle declared that before it could be stayed the murderer of Laius should be banished from the country, Œdipus was told by the seer Tiresias that he himself had both murdered his father and committed incest with his mother. In his horror he put out his own eyes, that he might no more look upon his fellow-creatures, while Jocasta hanged herself. He wandered towards Attica, accompanied by his daughter Antigone, and at Colonus near Athens the Eumenides charitably removed him from earth.

Œhlenschläger, ADAM GOTTLOB, Danish poet, was born 14th November 1779 in a suburb of Copenhagen, where his father, a Sleswicker, was an organist. After an irregular and desultory course of education, he tried unsuccessfully the career of an actor, and then took to law studies, but soon devoted all his energies to the cultivation of the history and poetry of his own country. In 1803 appeared his first collection of poems; and the *Vaulunders Saga* (1805) and *Aladdins forunderlige Lampe* raised him to the rank of the first of living Danish poets. These early efforts were rewarded by a travelling pension, which enabled him to spend some years in travelling the Continent, and becoming acquainted with Goethe and other literary celebrities. During this period Œhlenschläger wrote his *Hakon Jarl*, the first of his long series of northern tragedies (1807; Eng. trans. by F. C. Lascelles, 1875), and at Rome his *Correggio* (1809; Eng. trans. by Theodore Martin, 1854). In 1810 Œhlenschläger returned to Denmark, where he was hailed with acclamation, and made professor of Æsthetics in the university. In 1814 took place his literary feud with Baggesen (q.v.). In 1819 appeared one of his most masterly productions, *Nordens Guder*, which showed that the severe criticism to which his writings had been exposed during the celebrated Baggesen quarrel had corrected some of the faults, and lessened the self-conceit which had characterised his earlier works. His reputation spread with his increasing years both abroad and at home. In 1829 he went to Sweden, where he was welcomed by a public ovation; and he was honoured in his own country in 1849 by a grand public festival in the palace at Copenhagen. He died 20th January 1850. His fame rests principally on his twenty-four tragedies, most of them on northern subjects. Besides those already referred to, the best are *Knud den Store*, *Palnatoke*, *Axel og Walborg*, *Væringerne i Miklagord*. His lyrical and epic poems are of less value. His *Poetiske Skrifter* were edited in 1857–62 in 32 vols.; the German translations were done by himself. An Autobiography appeared in 1830–31, his Reminiscences in 1850; and there are Lives by Arentzen (1879) and Nielsen (1879). His Danish and German works amount in all to 62 volumes.

Oehler, GUSTAV FRIEDRICH, one of the greatest Old Testament scholars of the 19th century, was born at Ebingen, 10th June 1812, studied at Tübingen, laboured as a teacher at Basel and Tübingen, became in 1840 professor in the theological seminary in Schönthal, and in 1845 ordinary professor of Theology at Breslau. In 1852 he was called to Tübingen to be head of the theological seminary, and here he died, 19th February 1872. The chief books of this learned and reverent scholar were *Prolegomena zur Theologie des Alten Testaments* (1845), *Die Grundzüge der Alt-testamentlichen Weisheit* (1854), *Ueber das Verhältniss der A. T. Prophetie zur heidnischen Mantik* (1861), *Theologie des Alten Testaments* (1873–74; Eng. trans. 1874–75), and *Lehrbuch der Symbolik* (1876). See the study by Knapp (Tüb. 1876).

Œland, a long and narrow island in the Baltic, 4 to 17 miles from the east coast of Sweden. It is 55 miles long and 5 to 12 broad; pop. 37,513. Scarcely more than a limestone cliff, it is scantily covered with soil, but in some parts it is well wooded, and has good pasture-ground; there are large alum-works; and the fishing is excellent all round the coasts.

Oels, a manufacturing town of Prussian Silesia, 16 miles ENE. of Breslau by rail. Pop. 10,276.

Œnanthic Ether. See ETHER.

Œnoth'era, a genus of ornamental plants of the natural order Onagraceæ, related to the Fuchsia (q.v.), though strikingly dissimilar in general appearance. The Evening Primrose (*Œ. biennis*), a native of Virginia, has been known in Europe since 1614, and is now naturalised in many parts of Europe and in some parts of Britain, on the banks of rivers, in thickets, on sandy grounds, &c. The flowers are fragrant in the evening. The root somewhat resembles a carrot in shape, but is short; it is usually red, fleshy, and tender, and is eaten in salads, or in soups, and as a boiled vegetable. Eaten after dinner it incites to wine-drinking, as olives do. This and numerous other species of

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Œnothera, chiefly natives of North America, are very generally cultivated in English flower-gardens.

Evening Primrose (*Œnothera biennis*).

Oera Linda Book. See FRISIANS.

Œr'ebro, a town of Sweden, at the entrance of the Svarta into the Hjelmar Lake, 170 miles W. of Stockholm by rail. It has an ancient castle, in which many diets have been held; and there is a trade in minerals and matches. Pop. 13,618.

Oersted, HANS CHRISTIAN, physicist, was born 14th August 1777, at Rudkjobing, on the Danish island of Langeland, and studied medicine at Copenhagen, where in 1806 he was appointed extra-ordinary professor of Physics. He held numerous scientific appointments and honorary offices and distinctions, and died 9th March 1851. He may be regarded as the father of the science of electro-magnetism (see ELECTRICITY, Vol. IV. p. 265), and made numerous chemical discoveries. Of his many works the best known are *Naturlarens Mechaniske Deel* (1845; 3d ed. 1859) and *Aanden i Naturen* (1850). His collected works were translated into German in 6 vols. (1850–53). There is a biography by Hauch and Forchhammer (1853).—His brother, ANDERS SANDÖE (1778–1850), was a distinguished Danish statesman.

Oesel, an island in the Baltic belonging to the Russian government of Livonia, and lying across the mouth of the Gulf of Riga. It is about 45 miles in length from north-east to south-west, has an area of 1000 sq. m., and a pop. of 50,600. The surface is undulating, broken by low hills, marshy, watered by numerous small streams, and well wooded. The coast is generally formed by high cliffs. The climate is milder than that of the neighbouring continental districts. The only town is Arensburg, on the south-east coast (pop. 4000). Many of the inhabitants of Arensburg are of German descent, as are the nobles and clergy of the island; but the peasantry are Esthonian. Long governed by the Teutonic Knights, it became a Danish province in 1559, was given up to Sweden in 1645, and in 1721 fell into the hands of Russia.

Œsophagus, or GULLET, a membranous canal about 9 inches in length, which extends from the pharynx to the stomach, and thus forms part of the alimentary canal. See DIGESTION, Vol. III. p. 814; and CHOKING.

Œstridæ. See BOT.

Oetinger, CHRISTOPH FRIEDRICH, theosophic theologian, was born in 1702 at Göppingen, and, after holding various cures, died at Murrhardt, 10th February 1782. His sermons (5 vols.) were published in 1857, and his collected works (7 vols. edited by Ehmann) in 1858–67. His system has been described as lying between Jacob Boehme and Schelling. See monographs by Auberlin (1848), Ehmann (1852; 2d ed. 1877), and Wächter (1885).

Ofen. See PESTH.

Offa's Dyke, an entrenchment extending along the border of England and Wales, from the north coast of Flintshire, on the estuary of the Dee, through Denbigh, Montgomery, Salop, Radnor, and Hereford, into Gloucestershire, where its southern termination is near the mouth of the Wye. In some places it is nearly obliterated by cultivation; in others it is of considerable height. Nearly parallel with it, some two miles to the east, is *Watt's Dyke*, which, however, seems never to have been so great a work. Offa, king of Mercia, is said to have erected Watt's Dyke in 765 to keep back the Welsh, and Offa's Dyke a few years later.

Offenbach, a manufacturing town of Hesse-Darmstadt, on the south bank of the Main, 5 miles by electric railway SE. of Frankfort. Among its manifold industrial products are chemicals, fancy leather goods, machines, and carriages. The *schloss* is a residence of the princely House of Isenburg-Birstein. Pop. (1831) 7802; (1875) 26,012; (1885) 31,704.

Offenbach, JACQUES, a composer of opera bouffe, born of Jewish parents at Cologne, 21st June 1819. He came to Paris in 1833, and settled there, becoming *chef d'orchestre* in the Théâtre Français in Paris in 1848, and manager of the *Bouffes Parisiennes* in 1855. He died 5th October 1880. Offenbach composed a vast number of light, lively operettas, *La Mariage aux Lanternes*, *La Fille d'Elezondo*, &c., perfect as musical trifles; but the productions by which he is best known are a series of burlesque operas, in virtue of which he must be regarded as the inventor of the modern form of opera bouffe. Amongst the most notable are *Orphée aux Enfers* (1858), *La Belle Hélène*, *La Barbe Bleu*, *La Grande Duchesse*, *Geneviève de Brabant*, and *Roi Carotte*. *Madame Favart* (1878) became almost as popular in England as in France.

Offertory (Lat. *offertorium*, from *offero*, 'I offer') is the name given to that portion of the public liturgy of the Roman Catholic Church with which the eucharistic service, strictly so called, commences (see LITURGY). This offering of the bread and wine in the public service became, from a very early period, the occasion of a voluntary offering, on the part of the faithful; originally, it would seem, of the bread and wine designed for the eucharistic celebration and for the communion of the priest and the congregation. By degrees other gifts were superadded to those of bread and wine—as of corn, oil, wax, honey, eggs, butter, fruits, lambs, fowl, and other animals; and eventually of equivalents in money or other objects of value. The last-named class of offerings, however, was not so commonly made upon the altar and during the public liturgy as in the form of free gifts presented on the occasion of other ministerial services, as of baptism, marriages, funerals, &c.; and from this has arisen the practice in the Roman Catholic Church of the mass-offering, or *honorarium*, which is given to a priest with the understanding that he shall offer the mass for the intention (whence the honorarium itself is often called an 'intention') of the offerent. See also COLLECTIONS.

Officers, MILITARY AND NAVAL.—*Military Officers* are combatant and non-combatant, the latter term including paymasters, medical officers, commissariat, and other departmental officers. The great divisions of rank in the British army are commissioned, warrant, and non-commissioned officers. Commissioned officers hold commissions from the crown, and comprise all of the rank of second-lieutenant or corresponding or superior rank. Some warrant officers also hold honorary

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commissions. Classified by duties, they are staff or regimental officers; divided by rank, General Officers (q.v.), Field-officers (q.v.), and troop or company officers. The last are captains, lieutenants, and second-lieutenants. Warrant officers in the army are master-gunners (1st and 2d class), bandmasters, schoolmasters, garrison and regimental sergeant-majors, superintending clerks, and conductors of the army service and ordnance store corps. Non-commissioned officers are described under that heading.

Naval Officers are divided into three classes: commissioned, warrant, and subordinate officers. The commissioned officers are admirals, captains, commanders, lieutenants, sub-lieutenants, chief warrant officers, paymasters, doctors, engineers, and naval instructors. All officers of the civil branches of the navy, as paymasters, doctors, and engineers, rank relatively with officers of the military branch according to their standing in the service, as, for instance, an inspector-general of hospitals ranks with a rear-admiral, a chief-paymaster with a captain, and so on. The warrant officers are the boatswains, gunners, and carpenters. The third class comprises midshipmen, naval cadets, clerks, and engineer students; these officers have neither commissions nor warrants, but are simply appointed by the Admiralty; they are on probation, and are liable to be summarily removed at any time for such causes as failure to make satisfactory progress in their studies, general inefficiency, &c. No officer of the civil branch, no matter how high may be his relative rank, can ever assume any command, so long as an officer of the military branch is present. Petty officers are not officers, they are analogous to non-commissioned officers in the army; they will be described under their own heading, as they constitute a very important body of men in the navy.

Officinal Plants (Lat. *officina*, 'a shop') are those medicinal plants which have a place in the pharmacopœias of different countries, and which are therefore sold—or some of their products or preparations of them—by apothecaries and druggists. The medicinal plants cultivated to any considerable extent are all officinal, but many are also officinal which are not cultivated.

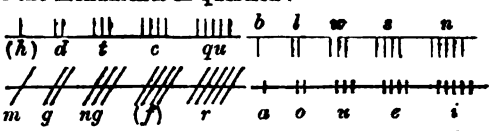
Offsets. See SURVEYING.

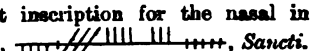
Ofterdingen, HEINRICH VON (*circa* 1400), one of the most famous Minnesinger (q.v.).

Ogam. This word is sometimes written Ogham, but it should then be pronounced with a *gh* mute, as in modern Irish, to which the spelling *Ogham* belongs. In English, however, it is preferable to pronounce the *g*, and to spell the word Ogam, as in older Irish; then there will be the noun *Ogam* and the adjective *Ogmic*, for which we have the sanction of such authorities as Whitley Stokes and Nigra.

The term Ogam is associated with Ogma, the champion of the mythic *Tuatha Dé Danann*—i.e. the tribes of the goddess Danu, or Dôn as she is called in the Mabinogion of the Welsh. Ogma's name is, letter for letter, the Irish equivalent of *Ogmios*, the name of the Gaulish divinity quaintly described by Lucian as a Celtic Heracles, which meant a Heracles who performed his feats by dint of eloquence, not by the force of his arms. So the Gauls pictured him leading crowds of willing captives, bound to him by minute chains connecting their ears with the tip of his tongue. The Irish account of Ogma is not inconsistent with the Gaulish one of Ogmios; for the former, besides being a warrior and the champion of the Tuatha Dé Danann, is represented as eminently skilled in languages; so he is said to have invented two things, a dialect for the learned, and an alphabet or form of writing. Both are called Ogam. The Ogam dialect, on which a learned paper by Dr Thurneysen should be read in the *Revue Celtique* (vol. vii. p. 369–374), proves to have been a jargon of artificial and pedantic origin. It is needless to say that the attribution of such an invention to Ogma can have formed no part of early Irish tradition about Ogma; and, as there is no reason to suppose the Ogam alphabet to date till late in the Roman occupation of Britain, much the same remark must apply to the invention of that form of writing. It is not hard, however, to see why both came in the course of time to be ascribed to Ogma: he was, like his Gaulish namesake, probably a hero of words, of speech, and of eloquence, so that any linguistic invention might readily gravitate into association with his name.

Putting aside the Ogam dialect, we shall now confine our remarks to the Ogam alphabet, premising that the key to it was never lost in Irish literature, though little attention was devoted to it by scholars till after the discovery of the bilingual inscription at St Dogmael's, near Cardigan, in South Wales. But in Irish manuscripts the values of the Ogam characters are naturally given as those of the Irish letters in the pronunciation familiar to the writers of those manuscripts; so when we deal with Ogams, let us say, of the 5th or the 6th century, certain corrections have to be made in the equivalents. The following is the Ogam alphabet, with the value of each symbol as it has been ascertained from the most ancient class of the monuments in question:



On this let us remark that the continuous line represents the edge of the stone on which the digits are cut. Taking an Ogam stone *in situ*, one most commonly reads upwards, and the scores are placed on either side of the edge. In some instances the vowels are not mere notches in the edge of the stone, but scores of nearly the same length as those of the third group, but differing from them in being cut perpendicular to the edge. This would seem to supply a reason for the slanting of the digits of the third group, but that is not supported by the most ancient class of inscriptions. Turning to the individual characters, the value of *h* given to the first of them is derived only from Irish tradition, but there is no reason to doubt its accuracy, though the writer has never come upon any good inscriptional evidence in point. The same, till lately, might be said of the case of *ng*, but he has found in an ancient inscription for the nasal in the borrowed word,  , *Sancti*. The case of is one of some difficulty, as the letter has never been found in an inscription, while Irish tradition ascribes it the value of *z* or *st*. This, however, does not mean two different accounts of the Ogam, as the Irish sometimes treated *z* and *st* as equivalents, as, for example, when they wrote *steta*, *Stephyrus*, and *Elistabeth* for *zeta*, *Zephyrus*, and *Elizabeth*. It should be explained that *st* has long been commonly reduced in Irish words to *s* or *ss*. Thus all that Irish tradition respecting this Ogam seems to mean is, that it was *z* or a certain other sibilant. Now, as to *z* representing the soft sound corresponding to the sharp sound of *ss*, it is not to be found in Irish from the 9th century down, and it is doubtful whether it existed in the language late enough to claim a place in the Ogam alphabet. We venture to accept the indication afforded by Irish tradition, that was a sibilant, or let us

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say an *s*, for that is the only sibilant known to the language, except *sh*, which is written *s* preceding *e* or *i*; we must therefore look for a class of words where the actual or attested *s* of Irish stands for a consonant which was at one time not an *s*. We have such probably in borrowed words, like *srian*, 'a bridle,' from the Latin *frenum*, or *seinistir*, 'a window,' from the Latin *fenestra*. But the change from *f* to *s* is not confined to borrowed words, as there is a group of words with *s* in modern Irish corresponding to Welsh *ff*, as in Irish *sonn*, Welsh *ffon*, 'a staff,' in which the initial combination of consonants seems to have been at first *sp* or *sp-h*. This would seem to have been simplified into *f* or *φ*, and that ultimately changed in Irish into *s*. We should accordingly be inclined to believe that *f* or *φ* was the value of the Ogam ////; and the phonetic change afterwards into *s* would account for the sibilant value ascribed to this Ogam by Irish tradition. Moreover, a genitive *Fanoni* in a Devonshire inscription, reading in Roman letters FANONI MAQVIRINI, shows that early Irish had the sound of *f* or *φ*; and as the Ogam alphabet provided no symbol for it, unless it was ////, this consideration confirms the conclusion already suggested. It is right here to remark that modern Irish has the consonant *f* in abundance, but in earlier Irish this was *w* or *v*, which between vowels has since been everywhere elided, while initially it has been strengthened into *f*; thus, in Adamnan's *Life of St Columba* the name *Fergna* is *Virgnous*, while the ancient *Terra Convaleorum* in Louth appears in the Annals of the Four Masters as *Tir-Conaille*, or rather *Tir-Conaille-Cerd*, to distinguish it from the district of Tirconnell in Donegal. As to the Ogam |||||, which we have transliterated *qu*, that combination, when written in Latin capitals, is found represented by QV, as in the MAQVIRINI, already cited; the exact pronunciation of the *u* cannot be ascertained, but it was probably not very far from that of the English *w*, as in one instance the QV is represented in Ogam by *qo* or |||||=, and in one other by *qw* or |||||'. In any case, it is worthy of note that no instance of confounding ||||| (*qu*) with |||| (*c*) is known to occur in the more respectable class of Ogam inscriptions. Lastly, a character × occurs, which was, as it were, outside the Ogam alphabet of twenty symbols. In Ireland this × had two values: sometimes it represented one of the sounds of *e* and sometimes the consonant *p*; the latter was also its value in South Wales, where it occurs in the Ogmic spelling of the genitive of the Roman name *Turpillus*. In Goidelic words themselves it cannot have been often wanted, as the *p* of the Aryan parent speech is nowhere retained in the Celtic languages. It is noticed, however, that in some words the place of Aryan *p* was occupied in Old Irish by *h*; e.g. *huile*, 'all,' from the same stem as the Greek πολλοί, 'many,' and *huathad*, 'the singular number,' from the same root as Latin *paucus*, English *few*.

A word must now be said of the distribution of Ogam monuments. All the Ogam inscriptions, whether still existing or known to have once existed, number not quite 300, most of which consist of epitaphs. Of that number about 250 belong to Ireland, mostly the southern counties, especially Kerry, Cork, and Waterford, though one has been heard of as far north as Londonderry. The Ogams in Britain and the islands make rather less than fifty in all, and of these South Britain has none east of Wales and Devon. Within this area the county which has most specimens to show is Pembrokeshire (including Caldy Island), and next in order come the other South Welsh counties and Devon, while Cornwall boasts only a single instance, and that of a somewhat doubtful nature. No Ogams have been found in Mid-Wales, and only one is known in North Wales—to wit, near Ruthin, in the county of Denbigh. The Ogams of Wales, however, and Devon have an importance out of all proportion to their number, owing to the fact that most of them are accompanied by a version in Latin. Proceeding northwards, one comes across a highly interesting group of Ogams in the Isle of Man; but the first Scotch Ogam is a very doubtful one, to be found, as it is supposed, in the island of Gigha, between Cantyre and Islay. There are, however, about fourteen Ogams mentioned as belonging to Scotland, most of which have no doubt attaching to them as to their being Ogams, though more doubt than enough exists as to the import of some of them, or even to the language employed. They occur in the counties of Fife, Aberdeen, Elgin, and Sutherland; also in the islands of Orkney, and more frequently in those of Shetland.

The Newton Stone, Aberdeenshire, from a photograph appended to the reprint of the Earl of Southesk's paper mentioned below.

The Ogam inscription, as distinguished from that in alphabetic characters, is thus read by the Earl of Southesk: (A)IDDAI QNEAN FORRERI IBH UA IOSIE, and interpreted as 'Ada, daughter of Forar, of the race of the sons of Huas.'

The writer once thought that Ogmic and Runic writing could be traced to a common origin; but he no longer thinks so. In his opinion the most probable theory is that which regards the Ogam alphabet as invented during the Roman occupation of Britain, by a Goidelic grammarian who had seen the Brythons of the Roman province making use of Latin letters. The Celts were in the habit probably of setting up stones to mark the tombs of their great men, but it was presumably from the Romans they learned to inscribe them. It has been supposed that the inventor of the Ogam alphabet took a hint from a habit of scoring for the purpose of counting, and that his group | || ||| |||| ||||' were the initials of the *h d t c qu* five first numerals, which in modern Irish are *aon*, *dá*, *trí*, *ceathair*, *cúig*, for this only required one to regard *aon* as if it were *haon*, with an *h* prefixed according to a habit by no means uncommon in the case of certain words in Old Irish. Such a theory proves on examination to be substantially tenable, as the early Goidelic forms of the numerals in question were approximately the following: *oinos*, *duŏ'u*, *trīs*, *cetuŏ'res*, *quĕqque*. The fourth, *cetuŏ'res*, represented an earlier *quetuŏ'res*, corresponding to the Latin *quatuor* and its congeners; but its first *u*, standing as it originally did in an unaccented syllable, was dropped, so that the word became *cetuóres*. The case of the initial *qu* of the fifth

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numeral was different, as it immediately preceded the accent, which, moving forward as usual in Irish, fixed itself on the *u* (of *qu*), made into a pure vowel, so that *quĕqque* became *qúeqque*, or rather *cúecce*, whence the attested forms *cóic* and *cuig*, 'five.' This is paralleled in Irish by *dóini*, 'men,' as contrasted with *duine*, 'man,' from some such Goidelic stem as *duĕ'n*, so that the word for man has been explained to mean a mortal, and in part equated with the Greek *θν-ητός*, 'mortal.' Now, Manx Gaelic has not altogether followed Irish in its accentuation, and here the transition from *qúeqque* to *qúeqque* never took place, so the Manx for 'five' is *queig*; compare Manx *quei* or *quoi*, 'who.' The case of the first Ogam is more difficult, as we should have to suppose *h-aon* and *h-oinos*, where the cognate languages prove that the *h* cannot have been organic, even though it sometimes crept into the pronunciation of this word. It is possible, however, that the word doing service for the first numeral was one of a different origin—for instance, a word related to *huathad*, 'the singular number,' and *huaitiu*, 'lonelier,' 'loneliest;' and it is worthy of notice that one of the names of the Ogam for *h* was *huath*. In such words as these the *h* may be supposed, as already suggested, to have been of ancient standing.

Another circumstance sheds light on the history of the Ogam alphabet: the oldest class of inscriptions contain so many instances of *cc* and *tt* where later Irish has *ch* and *th* that the former digraphs cannot be the result of accident, but rather a recognised way of representing the spirants *ch* and *th*. But as *cc* and *tt* do not phonetically become *ch* and *th* in the course of phonetic decay in the Goidelic dialects, the question arises, what can have suggested such a spelling? On the other hand, Brythonic speech is given to the change here suggested—viz. the reduction of *cc* and *tt* into *ch* and *th*, and before the spelling with *h* was regularly adopted the spirants *ch* and *th* must have been historically represented by *cc* and *tt*. This, we venture to infer, suggested the digraphs *cc* and *tt* for *ch* and *th* respectively. Granting that we are so far on fairly firm ground, we may go further, and suggest that the inventor of Ogam writing, acquainted as he was with Roman and Brythonic writing, lived somewhere in what is now South Wales, or had at anyrate visited that country: he probably belonged to the race of invaders from the south of Ireland, who made the Severn sea their highway to the heart of South Wales on the one side and Somerset and Devon on the other. The distribution of the Ogams indicate that the connection was close between the districts now represented by the counties of Pembroke and Waterford. The latter is divided by a low ridge of hills into Decies within Drum and Decies without Drum, where the name Decies refers to an ancient people called the Déisi, whom Irish tradition traces across to Pembrokeshire.

The ancient Ogams are all epitaphs on stone, but a few of the later ones occur on lead and on rings and brooches. So far as this goes, it might be gathered that stone was the most common material on which Ogams were cut; this may, however, be doubted, and more use may have been made of pieces of wood. In any case, when a workman had to cut an Ogam inscription on a tombstone, it was probably handed to him on a slip of wood with prepared angles. We can call to mind more than one instance where it can be shown that the cutter, so far from knowing what he was cutting, began the Ogam at the end instead of at the beginning. Had he had the Ogam before him on a piece of skin or any plane surface he might be expected to have cut the scores on the middle of the face of the stone. In fact, some of the specimens of Ogams from Shetland are found to have been so written; and as the edge of the stone would be represented in manuscript by a continuous straight line, we find a groove scratched on the flat part of the stones, and the Ogam scores arranged in connection with it instead of following one of the edges. So it is not improbable that prepared pieces of wood formed the most usual material for cutting Ogams, as they seem to have done for the Runic alphabets of Teutonic nations. It is needless to mention that Ogam is not a species of shorthand: few hands could well be longer; and it ought likewise to be needless to say that there is nothing cryptic about this method of writing. It is a pretty general rule, for example, that a compound word of four syllables in the 5th or 6th century A.D. appears as a word of two in the modern dialects of Goidelic, so that an Ogmic genitive *Luguquriti* is later met with compressed into *Luicrid*. Here the changes which have taken place are in harmony with the ascertained rules of Irish accentuation, and no Celtic scholar would think of saying that *Luguquriti* is a cryptic form of *Luicrid*: that would be simply to deny the history of the word any phonological perspective, and so in other cases. Lastly, for the study of Goidelic philology the importance of the Ogam inscriptions extant, few comparatively speaking and meagre as they are, is much the same as that of Roman inscriptions would be for Romance philology, supposing all other remains of Latin speech had utterly perished.

The most comprehensive work on Ogams is Brash's *Ogam-inscribed Monuments of the Gaedhil in the British Islands, with a Dissertation on the Ogam Character* (Lond. 1879); and next to it in point of comprehensiveness must be ranked Sir Samuel Ferguson's *Ogham Inscriptions in Ireland, Wales, and Scotland* (Edin. 1887), which consists of the Rhind Lectures delivered in Edinburgh in 1884. Papers on Ogams will be found in the *Trans. Roy. Irish Acad.*, especially by the Bishop of Limerick, who has also propounded a theory of the origin of Ogmic writing in the *Hermathena*. The journal which has above all others kept its pages open for Ogam finds in Ireland is that of the Royal Hist. Archæo. Assoc. Ireland (originally founded as the Kilkenny Society in the year 1849). Among other things its Journal for 1874 contains tracings made by G. M. Atkinson of old treatises on Ogams, together with explanations, including the theory of the numerical origin of the Ogams for *h*, *d*, *c*, *qu*, which we find to have been contributed by the Rev. Edmond Barry. The Ogams of Wales and Devon will be found in their places in Hübner's *Inscriptiones Britanniæ Christianæ* (Berlin, 1876). Further, those of the Principality have from time to time been noticed and illustrated in the *Archæologia Cambrensis*, and they will also be found in Westwood's *Lapidarium Walliæ* (Oxford, 1876–79). The Ogams of the Isle of Man have been described in the *Academy* and the *Manx Note-book;* and papers on the Scottish Ogams were read before the Society of Antiquaries of Scotland in the years 1882–84 by the Earl of Southesk after careful examination of the stones. The names in the Ogams of Wales and Devon have been discussed in detail in Rhys's *Lectures on Welsh Philology* (Lond. 1879), and some Ogmic forms have been used for the purposes of Celtic philology by Dr Whitley Stokes in his *Celtic Declension* (Gött. 1886). Lastly, the most important Irish tract on Ogams is to be found in the 15th-century manuscript known as the Book of Ballymote: it occupies folios 308–314 of the autotype edition (Dublin, 1887) of that extensive codex.

Ogasawara. See BONIN.

Ogden, capital of Weber county, Utah, is situated, at an elevation of 4340 feet, at the confluence of the Weber and Ogden rivers, where the former passes through the Wahsatch Mountains, 37 miles N. of Salt Lake City. It is of importance as the place where the Union Pacific and Central Pacific railroads, as well as three others, join. The city contains a Methodist university (founded 1890), a foundry and several mills, breweries, and

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manufactories of woollens, brooms, boots and shoes, &c. Pop. (1880) 6069; (1890) 14,889.

Ogdensburg, a port of New York, on the St Lawrence, at the mouth of the Oswegatchie, opposite Prescott, Canada, and 515 miles by rail NNW. of New York City. Its principal buildings are the Roman Catholic cathedral and the United States government building. The city has a large lake and river trade, and contains a huge grain-elevator and manufactories of flour, lumber, and leather. A steam ferry plies to Prescott. Pop. (1890) 11,662.

Ogee, Ogive. Ogive is the name given by the French to the pointed arch; and as an English architectural term, ogive ribs are the main ribs which cross one another at the intersection of the vaulting. Ogee, a form of the same word, is applied to a compound curve, made up of a convex curve continued by a concave one. Ogival work is common in the Decorated Style (q.v., fig. 3), and may be seen in the tracery of the Flamboyant (q.v.). The ogee moulding is that also called *Cyma reversa*, illustrated at MOULDING. The French word is from the Spanish *auge*, and that from the Arabic *áwj*, 'summit,' 'vertex.'

Ogier le Danois. See CHANSONS DE GESTES.

Oglethorpe, JAMES EDWARD, founder of Georgia, was born in London, 21st December 1698, the son of Sir Theophilus Oglethorpe, of Godalming in Surrey. After studying awhile at Oxford he joined the Guards before he was twenty, and served on the Continent with Prince Eugene. From 1722 to 1754 he represented Haslemere in parliament. Meanwhile he projected a colony in America, where the debtors then languishing in English gaols might start life afresh, and which should be also a refuge for the persecuted German Protestants (see SALZBURG). Parliament contributed £10,000, George II. gave a grant of the necessary land, after him called Georgia; and in 1733 Oglethorpe went out with a company of 130 persons and founded Savannah. In 1735 he took out 300 more, including the two Wesleys; and in 1738 he was back again with a regiment of 600 men, raised in anticipation of a war with Spain, from whose neighbouring colony of Florida he had already received annoyance. War was declared by the mother-countries in 1739, and in 1741 Oglethorpe invaded Florida and unsuccessfully attacked St Augustine (see his own account, published 1742); the next year he repulsed a Spanish invasion of Georgia. In 1743 he left the colony for the last time, to meet and repel before a court-martial the malicious charges of one of his own officers. He was again tried and acquitted after the Forty-five for having failed, as major-general, to overtake Prince Charles's army. The charter of his colony he surrendered to the British government in 1752. His later years were spent at Cranham Hall, his seat in Essex, where he died 30th January 1785. His intimate friends included many of the most eminent men of the day. Pope's couplet is well known:

> Or driven by strong benevolence of soul,
> Will fly, like Oglethorpe, from pole to pole.

Dr Johnson urged him to write his life, and even offered to do it himself; and Boswell made a few, but insufficient, notes with the same object.

See Lives by Harris (Boston, 1841), Wright (Lond. 1867), and Bruce (New York, 1890).

Ogowé, or OGOWAY, a river of West Africa, has its origin on the west side of the watershed that parts its basin from that of the Congo, in 2° 40′ S. lat., 14° 30′ E. long., flows north-west, west, and finally curves round by the south so as to pour its waters into Nazareth Bay, on the north side of Cape Lopez. It forms a wide delta of some 70 sq. m. in extent. In the dry season (July to September) it shrinks to a narrow current winding between the rocky obstructions of its bed; at other times it is a deep, broad stream, navigable by boats; numerous islands and sandbanks and shallows prevent vessels of any size from ascending. It has been dominated by France, through her colony on the Gaboon (q.v.), since 1885.

Ogy'ges, the earliest legendary king of Attica and Bœotia, in whose time a great flood took place called the Ogygian Flood.

Ogygia, a genus of Trilobites (q.v.), peculiar to the Lower Silurian system.

O'Hara, THEODORE, author of 'The Bivouac of the Dead,' was born at Danville, Kentucky, in 1820. He was a lawyer and journalist, but served as captain and major in the Mexican war, afterwards, for a year, in the United States cavalry, and in the civil war as a colonel on the Confederate side. He died in 1867. See monograph by Ranck (Baltimore, 1875), and the *Century* (May 1890).

O'Higgins. See CHILI.

Ohio, a river of the United States, called by the French explorers, after its Indian name, *la Belle Rivière*, next to the Missouri the largest affluent of the Mississippi, is formed by the union of the Alleghany and Monongahela at Pittsburgh, Pennsylvania, and flows west-south-west 975 miles, with a breadth of 400 to 1400 yards, draining, with its tributaries, an area of 214,000 sq. m. In its course it separates the northern states of Ohio, Indiana, and Illinois from the southern states of West Virginia and Kentucky. The principal towns upon its banks are Pittsburgh, Wheeling, Cincinnati, Louisville (where there are rapids of 22 feet in a mile, with a steamboat canal), Evansville, New Albany, Madison, Portsmouth, Covington, and Cairo. The river's principal affluents are the Tennessee, Cumberland, Wabash, Kentucky, Great Kanawha, Green, Muskingum, and Scioto. It is usually navigable from Pittsburgh.

Ohio, the fourth in population of the states of the American Union, lies between 38° 25′ and 42° N. lat. and 80° 30′ and 84° 50′ W. long. It stretches from north to south 210 miles, and from east to west 220 miles; the northern and southern and much of the eastern boundaries are irregular. Area, 39,964 sq. m., or equal to that of Ireland and Wales together. Ohio is a part of the original North-west Territory, chiefly claimed by Virginia under charters granted by the English kings, which territory became a corporate body soon after the formation of the Virginia colony; and when that colony became a state, the territory, with undefined northern limits, became a county. Ohio was the first state created within the territory, of which it comprises much of the best part. It is watered on the north by Lake Erie, and on much of the east and all of its southern boundary by the Ohio River, from which it derives its name.

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The face of Ohio, taken as a whole, presents the appearance of an extensive, monotonous plain. It is moderately undulating, but not mountainous; in many places streams have forced a way through bold cliffs of sandstone. A low ridge enters the state near the north-east corner and crosses it in a south-westerly direction. This 'divide' separates the waters of Lake Erie and the Ohio River, and maintains an average elevation of a little over 1300 feet above sea-level. North of this ridge the surface of the country is generally level, gently declining toward the lake. The central part of Ohio is almost a level plain, about 1000 feet above the sea, slightly inclining southward. The southern part is somewhat hilly, the valleys growing deeper as they approach the Ohio River, whose tributaries here water many extensive and fertile

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valleys. There are a few prairies or plains in the north-western parts of the state, but over its greater portion originally existed immense quantities of timber. The principal rivers draining southward to the Ohio are the Muskingum, Scioto, Great Miami, and Little Miami. Northward to the lake are the Tuscarawas, Cuyahoga, Sandusky, Huron, and Maumee, all but the last named being entirely in the state.

The rocks underlying Ohio belong to the Silurian, Devonian, and Carboniferous systems. The general arrangement of the geological formation shows a layer of sheets resting in the form of an arch from Lake Erie to the Ohio River. The limestone (No. 4) midway in the state is unbroken, and stretches from side to side; the Oriskany, the Corniferous, the Hamilton, and Huron formations, though generally removed from the crown of the arch, still remain over a limited area near the central portion. On the side of the great anticlinal axis the rocks dip downward into a basin, which for several hundred miles, north and south, occupies the interval between the Nashville and Cincinnati ridge and the first fold of the Alleghany Mountains. As they dip toward the centre of this trough, on the eastern and southern border of the state, the older rocks are deeply buried, and the surface is here underlaid by the Alleghany coal-measures; while in the north-western part of the state the strata dip northward and pass in the same way under the Michigan coal-basin. The coalfields of Ohio cover over 12,000 sq. m., the beds estimated to average 15 feet in thickness. Immense deposits of limestone, freestone, and mill-stones abound.

Archæologically Ohio is the richest field in America. In no other state have been found so many evidences of man's antiquity exemplified in implements of stone, bone, copper, and clay; while the most extensive and elaborate systems of earthworks in America are at Newark, near Chillicothe, and on the Miami bluffs near Waynesville. See MOUND-BUILDERS.

Ohio is one of the chief manufacturing states in the Union, leading all others in the manufacture of farm machinery, carriages and wagons, woollen and cotton goods, furniture, and wine and spirits. It has also great rolling-mills and iron-factories, glass-factories, potteries, and oil-works. In agriculture the state is first in the Union in many regards. Its annual production of maize is some 90,000,000 bushels, of wheat 40,000,000, of wool over 20,000,000 lb. Cattle and hogs are reared in large numbers. Ohio is a leading pork-producing state. The oil-fields, prevailing largely in the north-west, are being rapidly developed, and already the output is second only to that of Pennsylvania. Natural gas has been found in immense quantities, but at the present rate of consumption is soon exhausted.

History.—In 1787 the Ohio Company of Associates was organised in New England by those who had served in the war of the revolution, and under their auspices a large tract of land was purchased from the government in the territory north-west of the Ohio River, payment being made in 'Continental Certificates' issued to the soldiers for their services. This was the first public sale of land by the United States government. In connection with its sale the famous 'Compact' or 'Ordinance of 1787' was passed, guaranteeing for ever in the territory civil and religious freedom, the system of common schools, trial by jury, and the right of inheritance. In 1788 Marietta and Cincinnati were founded, and till 1791 settlements in the southern part of the territory increased rapidly. In that year the Indians became troublesome, owing to the continual encroachments of the whites, and an army under the governor suffered a disastrous defeat. In November 1794 a signal victory was gained by General Anthony Wayne over the Indians at 'Fallen Timbers' on the Maumee River. The year after a treaty of peace was concluded at Fort Greenville, the Indians ceding a great portion of territory, which settlers began at once to fill, and the towns of Xenia, Dayton, Hamilton, Chillicothe, Zanesville, Franklinton, and others were established. Chillicothe was made the seat of government for the territory, and a capitol building erected. In 1802 a constitution was adopted for the 'Eastern Division of the Territory North-west of the Ohio,' to be known as 'Ohio,' and on 19th February 1803 Ohio was formally admitted into the Union. By 1810 its population was 230,760, and the increase from that period was rapid. As early as 1812 steamboat navigation up and down the Ohio River was accomplished; by 1834 there were, as now, 709 miles of canal in operation; and the Mad River Railroad, begun in 1837, was opened for traffic in 1842, and completed to the lakes by 1848; in 1890, 7797 miles of railway traversed the state, not counting double tracks, &c. Ohio has given four presidents to the Union—Grant, Hayes, Garfield, and Benjamin Harrison.

Ohio is divided into 88 counties, and returns 21 members to congress. The justices of the supreme court are elected for terms of five years by the people. There are now 18,751 elementary and high schools, 44 academies of various kinds, 19 professional and art schools, and 34 colleges and universities. The ratio of illiteracy is less than the average of other states. The largest cities are Cincinnati, Cleveland, Columbus (the capital), Toledo, Sandusky, Dayton, Springfield, Steubenville, Portsmouth, Akron, Youngstown, and Canton. The total taxable value of real and personal property in 1890 was $1,778,138,477. Pop. (1850) 1,980,329; (1870) 2,665,260; (1880) 3,198,062; (1890) 3,672,316.

Ohlau, a town of Prussian Silesia, 20 miles SE. of Breslau by rail, on the Oder. Pop. 8575.

Ohm, GEORG SIMON, physicist, born at Erlangen, 16th March 1787, became in 1849 professor at Munich, and died there 7th July 1854. For Ohm's Law and the *ohm* as a measure of electric resistance, see ELECTRICITY, Vol. IV. p. 267.

Ohnet, GEORGES, a French novelist of great popularity, if not merit, born 3d April 1848 at Paris. He studied law, and after practising some time as an advocate took to journalism, and later to literature proper. Under the general title of *Les Batailles de la Vie* he has published a series of novels dealing comprehensively with social questions, some of which have actually reached a hundredth edition. The first in this cycle of romances was *Serge Panine* (1881), too quickly followed by *Le Maître de Forges* (1882), *La Comtesse Sarah* (1883), *Lise Fleuron* (1884), *La grande Marnière* (1885), *Les Dames de la Croix-Mort* (1886), and *Volonté* (1888).

Oïdium, or ERYSIPHE, a genus of minute fungi infesting various plants, and especially important as the cause of a ravaging disease of the vine, popularly known as vine-mildew. The disease was first observed in Kent in the spring of 1845; it spread rapidly over the English vineries, and was observed about the same time in the vineries of Paris, and soon afterwards in those of nearly all parts of France, Italy, Greece, Tyrol, and Hungary, and in a less degree in the Rhine valley. Its ravages extended to Algeria, Syria, Asia Minor, and especially to the island of Madeira, where it nearly put an end to the production of the celebrated wine. The disease appears first in the leaves, these drop off, the plant loses strength

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through impaired nutrition, the young shoots fall victims, and lastly the grapes. Powdered sulphur was found useful as a cure, but the applications had to be very frequent; in consequence of its importance the duty of sulphur was reduced by the French government. It is probable that in this case, as in all diseases of the sort, the general vitality of the organism must be lowered before it will fall a victim. Over-cultivation and long use of the same ground are predisposing causes.

Oil-beetle, a name given to beetles of the Melœ and allied genera, which when disturbed emit a yellowish oily liquor from the joints of their legs. Some species are used as vesicants instead of cantharides.

Oil-bird. See GUACHARO.

Oil-cake is used mainly for feeding sheep and cattle. It is made from the solid residue of oleaginous seeds (linseed, rape-seed, cotton-seed), after a large proportion of their oil has been extracted. The following is the usual process of manufacture in Britain. The seed is crushed between iron rollers, then damped and ground upon a mill of the following construction. Two large circular blocks of hard granite are set edgewise on a bed-stone of the same material, which is slightly hollowed out; these two upright stones are connected by a horizontal shaft which passes through the centre of both, and is fixed at its middle to a revolving upright shaft. The stones are thus made to revolve about their vertical axes, while at the same time they are left free to be turned round the horizontal shaft by the friction of grinding. The meal thus obtained is heated in kettles formed of two compartments, in the inner of which the meal is placed, while the outer is filled with steam. The meal is then filled into small woollen bags of the shape it is wished to make the cakes—usually oblong, about 30 inches by 12 inches, and ½ to ¾ inch thick. These bags are then placed in wooden 'wrappers,' which consist of two pieces of hard wood, of the same size as the cakes, hinged together at the end; the wood is usually corrugated and furnished with a stamp to mark the cakes. The wrappers containing the bags full of crushed seed are then placed in the compartments of a press worked on the same principle as a Hydraulic Press (q.v.), except that the oil from the seed is used instead of water. In this way about 90 per cent. of the oil the seed contains is squeezed out of it, leaving sufficient to bind the residue of ground husks into a solid firm cake. Sometimes the process is varied, in that the seed, instead of being ground under stones, is repeatedly crushed on iron rollers; in this case the crushed seed is steamed in the kettles to give the necessary moisture, not merely heated as described above. Sometimes oil-seeds are subjected to a chemical instead of a mechanical process—viz. solution of the oil in bisulphide of carbon. By this means the oil may be almost completely extracted. Mustard, rape, castor-oil, undecorticated cotton-seed cake, and some others are also used as fertilisers.

Oil City, Pennsylvania, on both sides of the Alleghany River (here crossed by long railroad and passenger bridges), 133 miles by rail N. by E. of Pittsburgh, is one of the principal oil markets in the state, and the centre of a busy trade. It contains, besides oil-refineries, engine- and boiler-factories, and a large cooperage. There were fearful inundations here in June 1892. Pop. (1870) 2276; (1880) 7315; (1890) 10,932.

Oil-fuel, Oil-gas. See FUEL, GAS-LIGHTING, PETROLEUM. For Oil-engine, see GAS ENGINE.

Oil Palm. See OILS, and PALM.

Oil Rivers. See NIGER.

Oils (including Fats). The fats and fixed oils constitute an important and well-marked group of organic compounds, which exist abundantly both in the animal and vegetable kingdoms. They are not simple organic compounds, but each of them is a mixture of several such compounds to which the term *glycerides* is applied; and the glycerides which by their mixture in various proportions form the numerous fats and oils are mainly those of palmitic, stearic, and oleic acids, and to a less extent those of other fatty acids, such as butyric, caproic, caprylic, and capric acids, which are obtained from butter, myristic acid, which is obtained from cocoa-nut oil, &c. The members of this group may be solid and hard, like suet; semi-solid and soft, like butter, horse-grease, and lard; or fluid, like the oils. The solid and semi-solid are, however, usually placed together and termed fats, in contradistinction to the fluid oils. The most solid fats are readily fusible, and become reduced to a fluid or oily state at a temperature lower than that of the boiling-point of water. It is not until a temperature of between 500° and 600° F. is reached that they begin nearly simultaneously to boil and to undergo decomposition, giving off acroleine (an acrid product of the distillation of glycerine) and other compounds. In consequence of this property these oils are termed *fixed oils*, in contradistinction to a perfectly separate group of oily matters, on which the odoriferous properties of plants depend, and which, from their being able to bear distillation without change, are known as *volatile oils*. These, which are also known as *essential oils*, differ *in toto* in their chemical composition from the compounds we are now considering. All the fats and oils are lighter than water, and are perfectly insoluble in that fluid. Their specific gravity ranges from about 0·91 to 0·94. They dissolve in ether, oil of turpentine (one of the volatile oils), benzol, and to a certain extent in alcohol; while, on the other hand, they act as solvents for sulphur, phosphorus, &c. These bodies possess the property of penetrating paper and other fabrics, rendering them transparent, and producing what is well known as a greasy stain. They are not readily inflammable unless with the agency of a wick, when they burn with a bright flame. In a pure and fresh state they are devoid of taste and smell, but on exposure to the air they become oxidised and acid, assume a deeper colour, evolve a disagreeable odour, and are acrid to the taste; or, in popular language, they become *rancid*. The rapidity with which this change occurs is considerably increased by the presence of mucilaginous or albuminous bodies. The rancidity may be removed by shaking the oil in hot water in which a little hydrated magnesia is suspended.

The general diffusion of fats and oils in the animal kingdom has been already described (see FATS). In the vegetable kingdom they are equally widely distributed, there being scarcely any tissue of any plant in which traces of them may not be detected; but they are specially abundant in the seeds. The seeds of the Cruciferæ are remarkably rich in oil; linseed yielding fully 20 per cent., and rape-seed about 40 per cent. of oil; and some fruits, as those of the olive and oil-palm, yield an abundance of oil.

The uses of oils and fats are numerous and highly important, many being extensively employed as articles of food, as medicines, as lubricating agents, in the preparation of soaps, ointments, varnishes, pigments, for candles, lamps, and other means of illumination, and for the purpose of dressing leather, &c. In Africa, Asia, and the Pacific animal and vegetable oils and fats are much used for anointing the person and smearing the hair, thus affording a protection against heat

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and the attacks of insects, and checking excessive perspiration. This practice conduces to health and preserves the skin smooth and soft. Oil thrown on the sea has a remarkable effect in subduing the force of the waves. A few gallons cast upon stormy seas moderates and prevents the waves breaking with force. This practice might be adopted by lifeboats when approaching wrecks, and rescuing the crews of stranded vessels. The composition of the fine oils required for watches and sewing-machines is often carefully kept secret. Those principally used are ben, almond, olive, and neat's-foot. The oils suitable for machine-shops and general cotton and woollen machinery require a good body, rather viscid. For woollen spindles a lighter oil, and for cotton spindles, which have a speed of 4000 revolutions per minute, an oil of still lighter body. For lubricating purposes mineral oils may with advantage be mixed with animal and vegetable oils to diminish their tendency to thicken; the more fluid an oil is the less friction takes place.

(1) *Vegetable Fats.*—The chief solid fats of vegetable origin are cocoa-nut oil, nutmeg-butter, cocoa-butter, and palm-oil. The fluid vegetable fats or oils are divisible into the *non-drying* and the *drying oils;* the latter being distinguished from the former by their becoming dry and solid when exposed in thin layers to the air, in consequence of oxygenation. Some of the drying oils, when mixed with cotton, wool, or tow, absorb oxygen so rapidly, and consequently become so heated, as to take fire, and many cases of the spontaneous combustion of heaps of oily materials that have been employed in cleaning machinery have been recorded. The chief non-drying oils are olive-oil, almond-oil, and colza-oil; while the most important drying oils are those of linseed, hemp, poppy, and walnut; castor-oil seems to form a link between these two classes of oils, since it gradually becomes hard by long exposure to the air.

(2) *Animal Fats.*—The chief solid fats are beef and mutton suet or tallow, lard, butter, goose-grease, &c.; while among the fluids sperm-oil, ordinary whale-oil, cod-liver oil, and neat's-foot oil may be especially mentioned. In many of their characters spermaceti and beeswax resemble the solid fats. As a general rule, stearin and palmitin, both of which have comparatively high fusing-points (between 157° and 114° F.), preponderate in the solid fats; while olein, which is fluid at 32°, is the chief constituent of the oils.

When any of these bodies are heated with the hydrated alkalies they undergo a change which has long been known as Saponification, or conversion into Soap (q.v.), in which the fatty acid combines with the alkali to form a *soap*, while the sweet viscid liquid glycerine is simultaneously formed. When the fatty acids are required on a large scale, as for the manufacture of the so-called stearin candles, which in reality consist mainly of stearic and palmitic acids, sulphuric acid and the oil or fat are made to act upon each other at a high temperature (see CANDLE). The fatty acids may also be procured in a very pure form by the injection of superheated steam at a temperature of between 500° and 600° into heated fat. A complete list of even the chief fats and fixed oils would take up far more space than we can command. The more important are noticed in separate articles, such as Fixed Oil of Almonds, Castor-oil, Croton-oil, &c., and some account given of their properties and uses; or under the names of the substances from which they are procured—Linseed, Rape, Candle-nut, Cocoa-nut, Cotton (for Cotton-seed Oil), &c. Reference may also be made to the articles on Butter, Ghee, Lard, Cod-liver Oil, &c.

The *Volatile* or *Essential Oils* exist, in most instances, ready formed in plants, and are believed to constitute their odorous principles. They form an extremely numerous class, of which most of the members are fluid. Many used for flavouring are artificially compounded (see BUTYRIC ACID). Essential oils are much employed in perfumes, for flavouring liqueurs and confectionery, and for various purposes in the arts. They will be described at PERFUMERY. The *mineral oils* will be found discussed under the heads of Naphtha, Paraffin, Petroleum.

OILS IN THEIR COMMERCIAL RELATIONS.—*Vegetable Oils.*—The principal seeds imported for expressing oil are cotton, linseed, rape, and ground-nut; but many others are received in small quantities. *Cotton-seed* is now a very important product, which was formerly much neglected. The imports into Britain rose from about 20,000 tons in 1861 to over 314,000 tons in 1890, nearly all coming from Egypt: 100 lb. of seed yield about 2 gal. of oil. The seed fetches £5 to £6 a ton; the oil £18 to £21 a tun. *Linseed.*—British imports of this flax-seed now reach over 2,000,000 qr., of the value of £4,000,000. Nearly all the supply used to be obtained from Russia, which produces the best seed, but now the chief imports are from India; these arrive, however, very much mixed with rape and other seeds. India ships about 8½ million cwt. of linseed yearly, of which three-fourths is sent to England. One quarter of linseed will yield by pressure 120 lb. of oil and 2½ cwt. of oil-cake. The average annual production of linseed-oil in the United Kingdom may be taken to be about 120,000 tuns. India is the chief source of supply for the small oil-seeds, the value of those exported annually ranging from £9,500,000 to £10,750,000, besides about £500,000 more for the oils of various kinds shipped. Africa alone supplies palm-oil and large quantities of ground-nuts; Ceylon, India, and the Pacific islands the cocoa-nut oil of commerce. *Cocoa-nut Oil* is expressed from the albumen or ripe kernel of the nut, known in commerce when dried as copra. The production of this oil does not make the same progress that palm-oil does, as the following decennial imports into the United Kingdom will show: 1870, 198,602 cwt.; 1880, 318,454 cwt.; 1890, 184,409 cwt. The price of the oil declined about £10 in 1883–90, the price being in the latter year £27 per ton. *Palm-oil.*—The average imports of this oil are 50,000 tons annually. Prices have advanced of late years, and in 1890 stood at £26 per ton. This oil forms a chief ingredient in the grease used for railway axles. *Rape-seed.*—The imports of rape range between 459,000 to 2,300,000 qr., of which about half come from Russia and half from India. The total exports of this seed from India now exceed 3 million cwt., valued at nearly £2,000,000 sterling; the great bulk of this is sent to France and Belgium. From the first pressure rape-seed will yield about 90 lb. of oil per quarter, and from a second pressure 60 to 70 lb. The *Ground-nut* (*Arachis hypogæa*) is now a large source of oil-supply, but the principal commerce and manufacture centre at Marseilles. It is principally cultivated on the west coast of Africa, but is now much grown in India. The price of the shelled kernels in the London market is from £11 to £13 per ton. *Olive-oil* used to be one of the most valuable vegetable oils used for food, but it is now much adulterated with or replaced by Gingelie and cotton-seed oils. The average imports are about 20,000 tuns, the best Spanish fetching £37 per tun. For lubricating and woollen manufactures olive-oil has been largely replaced by other vegetable oils and lard-oil (see OLIVE). *Gingelie* or *Til-oil* is the produce of the seed of *Sesamum indicum*, which yields about 50 per cent. of oil; and

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the annual export of this seed from India is from 1½ to 2¾ million cwt. It goes principally to France and Italy. The price is 40s. to 50s. the 384 lb. *Poppy-seed.*—The trade in this seed from India is a fluctuating one, ranging from 450,000 to 730,000 cwt.; the exports are chiefly to France and Belgium. The seeds yield 45 per cent. of oil, which is used for culinary purposes. The seed sells at about 43s. the bag of 368 lb. *Castor-oil seed.*—From 600,000 to 700,000 cwt. of this seed are exported annually from India, and 2,000,000 to 2,600,000 gal. of the castor-oil. The expression of the oil is chiefly carried on in Italy and America, besides India. The various species of Bassia of India and Africa yield good oils, some of which are semi-solid and esteemed for soap-making. Under the name of Mahwa about 100,000 cwt. are shipped from India (see BUTTER-TREE).—One or two species of Aleurites produce what are known as candle-nuts in commerce; these yield 50 per cent. of oil. Some species of Garcinia yield kokum-butter, which is used as a substitute for ghee or clarified butter by the poorer classes of India. Many species of nuts, such as the Brazil, hazel, walnut, and others, yield oil which is used locally, but does not enter largely into commerce. In China oil is obtained from the Soy bean (*Soja hispida*), and it yields about 18 per cent. of a drying oil. The bean-cake is employed for feeding men and animals, and is also largely used for manure. Another oil made there is from the seed or fruit of the *Camellia oleifera.* It is of remarkable purity, of an amber colour, and possesses a pleasant taste. In the United States corn or maize oil and pea-nut oil are manufactured, as well as cotton-seed oil, linseed-oil, and castor-oil. The cocoa seeds or beans of commerce contain from 18 to 20 per cent. of a concrete fat, which being separated in the preparation of cocoa and chocolate, throws a large amount of cocoa-butter on the market. Several thousand tons of it in flattened cakes are now sold annually in London and Holland. It is used for pharmaceutical purposes and confectionery. Nutmeg-butter, Galam butter (Bassia), Carapa, Carnauba, and certain vegetable tallows and waxes partake of this solid character.

Animal Oils.—The principal solid animal oils found in commerce are butter and lard, tallow, mares' grease, neat's-foot oil, and unrefined yolk of egg oil. The first two are fully described under their names. Tallow is the fat of oxen and sheep, but more especially the fat which envelops the kidneys and other parts of the viscera, rendered down or melted. The qualities of this solid oil make it particularly well adapted for making candles, and until the end of the first quarter of the 19th century candles for ordinary use were almost wholly made of it. Britain obtains probably about 60,000 tons of tallow yearly at home, and receives as much from abroad, chiefly imported from North and South America and Australia. Russia used to furnish the chief supply, but the pastoral progress in the new countries has quite changed the sources of supply of animal fats. The imports of tallow and stearin do not vary greatly from year to year; they were, in 1870, 1,523,298 cwt.; 1880, 1,316,379 cwt.; 1890, 1,385,517 cwt. The value of the last-named year's imports was £1,729,349. The oleins, obtained by pressure from animal fats, are known in commerce as tallow-olein, lard-olein, and neat's-foot oil; they come next in value to sperm-oil. The two former are included under animal oils. Many thousand tons of these oleins are sent from the United States to Europe for artificial butter-making. Besides the home production of butter, which is large (about 130,000 tons), the United Kingdom imported in 1890 over 100,000 tons, valued at £10,500,000, and 54,000 tons of an artificial compound prepared from tallow, chiefly in Holland, and which has to be labelled as 'margarine' when sold; for this more than £3,000,000 is paid (see BUTTERINE). Of lard-oil Britain imports 91,000 cwt., besides about 27,000 cwt. of other animal oils, such as mares' grease, tallow-oil, &c. Lard-oil from which the stearin has not been pressed is known as 'neutral oil.' An olein is extracted from beef-suet in the United States, of which there are three qualities. Several thousand tons of this animal oil are sent from Chicago to Holland for the manufacture of oleomargarine. The export of this olein from the United States averages now 30,000,000 lb. yearly, valued at £600,000. *Horse-grease* is received from the River Plate states, where there are over five million horses. The mares, which are never used for the saddle, are annually slaughtered in large numbers in the republics of Uruguay and Argentine. A little horse-grease is also obtained in Britain from the slaughtered horses, 400 to 500 dying weekly in London alone. They furnish about 28 lb. of grease each, which is valuable as a lubricant. *Neat's-foot oil* is obtained in boiling down the feet of cattle. It does not turn rancid, and remains fluid at 32°. When part of its stearin has been abstracted it is used for oiling church and steeple clocks (as it does not solidify), for softening leather, and other purposes. In North America, where swine are bred so largely, the melted fat of the pig is a very important secondary product. The United States, with its 50 million pigs, sends away lard to the value of £5,500,000 yearly. It is a very important food-product, and in the West Indies it is much used instead of butter. The imports of lard from America into Britain now average 60,000 tons yearly, of the value of £2,000,000. The imports increased fivefold in 1870–90. Another animal fat is the suint obtained in the process of washing wool. This potassic sudorate forms no less than a third of the weight of raw wool in the grease.

Marine oils are obtained from various mammals and fishes in different localities. Much of the oil obtained passes under the general name of 'train-oil.' The whale-fishing has been much abandoned of late years by the nations which formerly pursued it; but the seal-fishing, which is less precarious and hazardous, is extensively prosecuted. The value of the oil shipped from Newfoundland annually exceeds £100,000. The average value of the fish-oil imported into Britain is only about £420,000; about 1880 it used to be double that amount. In America and the north of Europe fish oils are principally obtained from the liver of the cod and shark, from the dogfish, porpoise, Menhaden (q.v.), pilchard, herring, sardine, and other Clupea. In the Mediterranean the tunny yields a large quantity of oil, extracted by boiling, often in sea-water. It is of a pale amber colour and an agreeable flavour.

Fish oils are often confounded with the oils obtained from the blubber of the whale, seal, and other marine mammals, and their oil is much mixed with these. The great trade in animal oils and fatty substances indicates the care with which oily matters rich in carbon and hydrogen are sought for, supplying as they do a great number of wants in countries the most civilised as well as among people still in their primitive state. Some of these oleaginous substances are employed as food by man, some in manufactures, and others in medicine. The fish oils are usually thick, with a strong odour, and of different colours, according to quality and preparation, ranging from white to blonde and brown. In northern countries they still serve for illumination, but of late years have been largely superseded in this use by gas, petroleum, and

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electric lighting. Fish oils are valuable for soap-making and also much employed by curriers for dressing leather; and the oil is again recovered and sold for further use under the name of *degras* and sod-oil. Sharks are largely caught off the Norway coast and in the Indian seas, chiefly for their oil. In Greenland 300 or 400 are taken every season, their livers yielding 2500 barrels of oil, which is much valued for lubricating. *Spermaceti*, or 'head matter,' as it is commercially termed, from the oil being principally found in the enormous head of *Physeter macrocephalus*, has, like whale-oil, been declining largely of late years. Britain only receives some 1430 tuns, valued at £56,325, against three times that quantity imported about the year 1880. It used to be much employed in candle-making, mixed with about 5 per cent. of beeswax to prevent crystallisation (see WHALE). *Seal-oil* is hence included with train or fish oil. The exports from Newfoundland range from 3500 tuns to 6000 tuns yearly, according to the catch of seals. In 1889 Great Britain imported from that island 7000 tuns of oil, valued at nearly £67,000. There was a large decline—fully 50 per cent.—in the prices of fish oils in the years 1889–90. The current prices in 1890 per tun of 252 gallons were, for sperm, £45 to £46; whale-oil, £21 to £23; pale seal-oil, £24 to £26; and cod-oil, £22. The medicinal cod-liver oil realises higher prices. Fuller information on the preparation of these will be found under the various heads. In 1878 the British imports of fish oils of all kinds were 20,656 tuns, valued at £810,891; in 1890, 20,302 tuns received were only valued at £419,296. In various quarters a considerable quantity of oil is obtained from different birds, such as the fulmar, the penguin, puffins, and species of Procellaria, the Guacharo (q.v.), the goose, ostrich, emu, and rhea, the passenger pigeon, and others; but, with the exception of penguin-oil from the Falklands, none of these appear to any extent in commerce, and are only used locally.

The large and growing importance of the oil trade is manifest from a consideration of the statistics of imports and exports alone in a year, independent of the various industries and labour interested therein. Taking the English Board of Trade figures for 1889, we find that the value of the imports of animal oils and fats, including butter, lard, tallow, &c., amounted to £18,395,518, the vegetable oils to £3,718,074, the mineral oils to £2,963,834, and the nuts and seeds imported for expressing oil to £8,269,678, making a total of £33,347,104. The imports are nearly all used in Britain, the re-exports being merely to the value of £3,531,242. If to this we add the £1,701,106 for oil-seed cake imported, and the export of oil, soap, and candles of British manufacture, amounting to £2,507,095, we have a total capital involved in the trade of over £37,500,000, and this quite irrespective of the home production of tallow, butter, fish oils, and the like.

Oil-wells. See BAKU, PENNSYLVANIA, PETROLEUM.

Oinomania. See DIPSOMANIA.

Ointments are fatty substances intended to be applied to the skin by rubbing in, and having the consistence of butter. The material employed as a basis for the ointment varies considerably, and as a rule the activity and action are entirely due to the substance incorporated with the basis. The most generally used basis is lard, either alone or mixed with wax, &c., to give it more consistence. To avoid rancidity the lard is usually melted previously with gum-benzoin, and is then known as *benzoated lard*. Although lard is readily absorbed by the skin, yet in this respect it is surpassed by sheep's wool fat and Oleic Acid (q.v.). The former of these, when incorporated with water, forms an excellent ointment base, smooth, and in every way suitable. So also some of the unctuous oleates are used with great advantage. Soft paraffin, known in commerce under a number of names, has also been used for ointments and does not turn rancid, but on the whole its use is not extending. As nearly all substances may be made into ointments, there is no limit to their number, but perhaps the best known are Zinc Ointment (q.v.), Boracic Ointment, and the Red and White Precipitate Ointments (see PRECIPITATE OINTMENT). In all cases the greatest care is required to ensure that the active principle is rubbed perfectly smooth with a small quantity of oil or lard before adding the bulk of the ingredients, otherwise the production of a homogeneous ointment free from grit is impossible. See COLD CREAM.

Oise, a department in the north of France, separated from the English Channel by Seine-Inférieure; area, 2261 sq. m.; pop. (1881) 404,555; (1886) 403,146. The principal rivers are the Oise, a tributary of the Seine, 150 miles in length, with the Aisne and Therain, affluents of the Oise. The soil is in general fertile, and agriculture advanced. The products are the usual grain-crops, with an immense quantity of vegetables, which are sent to the markets of the metropolis. There are extensive iron manufactures; porcelain, paper, chemicals, beet-root sugar, woollens, cottons, and lace (at Chantilly) are also made. The department is divided into the four arrondissements of Beauvais, Clermont, Compiègne, Senlis; capital, Beauvais.

Oisin. See OSSIAN.

Ojibbeways. See CHIPPEWAY INDIANS.

Oka, an important navigable river of central Russia, the principal affluent of the Volga from the south, rises in the government of Orel, and flows in a generally north-east direction, and joins the Volga at the city of Nijni-Novgorod, after a course of 706 miles. Its basin comprises the richest and most fertile region of Russia. The principal towns on its banks are Orel, Bielev, Kaluga, Riazan, and Murom; the most important affluents are the rivers Moscow, Kliasma, and Tzna. During spring the Oka is navigable from Orel to the Volga; but in summer the navigation is obstructed by sand-banks.

Okavango. See NGAMI.

Okeechobee, a lake of Florida (q.v.).

Oken (originally Ockenfuss), LORENZ, naturalist, was born at Bohlsbach, in Baden, August 1, 1779. He studied at Würzburg and Göttingen; became extra-ordinary professor of Medicine at Jena in 1807; in 1812 he was appointed ordinary professor of Natural Science; and in 1816 he commenced the publication of a journal partly scientific and partly political, called *Iris*, which led to government interference and his resignation. In 1828 he obtained a professorship in the newly-established university of Munich, but in 1832 exchanged it for another at Zurich, where he died 11th August 1851. Oken aimed at constructing all knowledge *a priori*, and thus setting forth the system of nature in its universal relations. His system of natural science is a nature-philosophy, which, though decried as transcendental and a deduction from foregone conclusions, was fertile in suggestive ideas. It was he who wrought out the theory, claimed by Goethe, and now exploded, that the skull is but a modified vertebra.

His principal works are his *Lehrbuch der Naturphilosophie* (1808–11; Eng. trans. 1847), his *Lehrbuch der Naturgeschichte* (3 vols. 1813–27), and *Allgemeine Naturgeschichte* (17 vols. 1833–45). See works on Oken by Ecker (1880) and Guttler (1884), and see Sir Richard Owen's article in the *Encyclopædia Britannica*.

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Okhotsk, SEA OF, an extensive inlet of the North Pacific Ocean, on the east coast of Russian Siberia, nearly enclosed by Kamchatka and the Kuriles and Saghalien. It is little navigated. On its northern shore, at the mouth of the Okhota, is the small seaport of Okhotsk, with a pop. of 300.

Oklahoma, a territory of the United States, comprises two detached sections, between which lies a tract known as the Cherokee Outlet. The main portion is bounded W. and S. by Texas, E. and SE. by Indian Territory, from which it is separated by a very irregular line, and N. by Kansas and the Cherokee Outlet, the latter lying between the southern border of Kansas and the parallel 36° 10′ N., and extending from the vicinity of the Arkansas River to the 100th meridian. The other portion of the territory is the Public Land Strip situated N. of the Texas 'pan-handle' and S. of the parallel 37° N. This strip, ceded to the United States by Texas at the time of its annexation, was by an oversight not included in any of the adjacent states or territories, and until its incorporation in Oklahoma Territory was known as No Man's Land. The combined area, exclusive of the Cherokee Outlet, is about 35,000 sq. m. The population is 61,834, including 5338 persons in Greer county, situated between the forks of the Red River and claimed by Texas.

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The surface, which rises gradually toward the north and west, is for the most part an upland prairie. The most important elevations are the Wichita Mountains in the south. The charms of Oklahoma ('Beautiful Country') have been much overrated. It is fairly well watered by the Red and Arkansas rivers and their affluents, but many of the streams are brackish, and so saturated with alkaline salts as to be at times unfit for drinking purposes or for irrigation. The rainfall is much lighter and also less uniform than in Indian Territory. In the river-valleys and in some of the upland regions there are fertile and productive spots, but much of the region is likely to be subject to the same disappointment which prevails in western Kansas during unfavourable seasons. The Public Land Strip, which constitutes one of the counties of the territory, has an arid and unproductive soil covered here and there with a sparse growth of cactus, yucca, and sage-brush. The climate is generally mild, but subject to sudden changes produced by the 'northers' which are common in this region.

The history of Oklahoma dates from the year 1866, when the tribes to whom the lands of Indian Territory had previously been granted ceded the western portion of their domain to the United States. The land thus acquired was known as the Oklahoma district, but it was agreed that it should be used only for settlement by other Indian tribes or freedmen. Notwithstanding this stipulation western speculators claimed that the lands were the property of the government, and open, like other public lands, for settlement under the Homestead (q.v.) laws. In 1879 an organised effort was made to take forcible possession of the lands, and adventurers from Texas, Kansas, and Missouri, equipped and ready for permanent settlement, invaded the territory. Their action was forbidden by proclamations from President Hayes, and the intruders were finally ejected by United States troops. From this time until his death in 1884, David L. Payne, the leader of the 'boomers,' was repeatedly arrested, but he always evaded punishment and returned to the forbidden land, with the number of his followers augmented. He is said to have received more than $100,000 in fees from persons who secured from him permission to settle in Oklahoma. After his death the invasions were continued with even greater pertinacity by his lieutenants. Although the government repeatedly proclaimed the integrity of the treaties with the Indians and enforced them by the authority of the military, negotiations were opened, as a result of which, upon the receipt of an additional sum, the Indians waived all claims to a district in the heart of Indian Territory. This unoccupied area was opened for public settlement on April 22, 1889. No one was allowed to enter the borders until noon, but between that hour and twilight the population was increased by at least 50,000. Claims were selected, town sites staked out, and portable houses erected before nightfall. At Guthrie a bank with $50,000 capital did a prosperous business during the afternoon. The territory was regularly organised with extended boundaries on May 2, 1890. The relation which the Cherokee Outlet maintains to the territory which exercises jurisdiction over it may be best comprehended by quoting the words of the official act: 'Whenever the interest of the Cherokee Indians in the lands known as the Cherokee Outlet shall have been extinguished and the president shall make proclamation thereof, said Outlet shall thereupon and without further legislation become a part of the territory of Oklahoma.' The territory contains seven counties, of which the county seats and principal towns are Guthrie, Oklahoma City, Norman, El Reno, Kingfisher City, Stillwater, and Beaver.

Okra, a name for the *Hibiscus* (q.v.) *esculentus*.

Olaf, the Saint, one of the most revered of the early Norwegian kings, was born in 995, and after having distinguished himself by his gallant exploits, and made his name a terror in several warlike expeditions on the coasts of Normandy and England, succeeded, in 1015, in wresting the throne of Norway from Eric and Svend Jarl. The cruel severity with which he endeavoured to exterminate paganism by fire and sword alienated the affections of his subjects, who hastened to tender their allegiance to Canute of Denmark on his landing in Norway in 1028. Olaf fled to the court of his brother-in-law, Jaroslav of Russia, who gave him a band of 4000 men, at the head of whom he returned, in 1030, and gave Canute battle at Stiklestad, where Olaf was defeated by the aid of his own subjects, and slain. His body was removed to the cathedral of Trondhjem, where the fame of its miraculous power spread far and wide; and Olaf was solemnly proclaimed patron saint of Norway in the succeeding century. See *Passio et Miracula Beati Olavi*, edited by F. Metcalfe (Oxford, 1881).

Oland. See ŒLAND.

Olaus. For Olaus Magnus, see MAGNUS; for Olaus Petri, see SWEDEN (*Literature*).

Olbers, HEINRICH WILHELM MATTHÄUS, physician and astronomer, was born at Arbergen, a village of Bremen, October 11, 1758, studied medicine at Göttingen from 1777 till 1780, and subsequently practised at Bremen. In 1811 he was a successful competitor for the prize proposed by Napoleon for the best 'Memoir on the Croup.' He became known as an astronomer by his calculation of the orbit of the comet of 1779. He discovered the minor planets Pallas (1802) and Vesta (1807); and in 1781 he had the honour of first rediscovering the planet Uranus. He also discovered five comets in 1798, 1802, 1804, 1815, and 1821, all of which, with the exception of that of 1815 (hence called *Olbers' comet*), had been some days previously observed at Paris. His observations, calculations, and notices of various comets, which are of inestimable value to astronomers, were published in various forms. Olbers also made some

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important researches on the probable lunar origin of meteoric stones, and invented a method for calculating the velocity of falling stars. He died at Bremen, 2d March 1840. His correspondence with Bessel was edited by Erman (1852).

Old Bailey, the court or sessions house in which the sittings of the Central Criminal Court are held monthly for the trial of offences within its jurisdiction. The judges of this court are the Lord Mayor, the Lord Chancellor, the judges, aldermen, recorder, and common serjeant of London. But of these the recorder, the serjeant, and the judge of the sheriff's court are in most cases the actually presiding judges. The judicial sittings here are of such antiquity that all record of their commencement has been lost. Crimes of all kinds, from treason to petty larceny, are tried, and the numbers in past times were enormous, but are now greatly reduced by the extended jurisdiction given to the quarter sessions, and the summary powers granted to magistrates. Here were tried in 1660, after the Restoration, the surviving judges of Charles I.; and Milton's *Eikonoklastes* and *Defensio Prima* were in the same year burned at the Old Bailey by the common hangman. The patriot Lord William Russell was tried here in 1683, Jack Sheppard in 1724, Jonathan Wild in 1725, the poet Savage in 1727, Dr Dodd in 1777, Bellingham, the assassin of the statesman Perceval, in 1812, the Cato Street conspirators in 1820. The Old Bailey dinners given by the sheriffs to the judges were long famous. However else varied, they always included beefsteaks and marrow puddings, and were served twice a day. The Old Bailey adjoins Newgate (q.v.) Prison, between Holborn Viaduct and Ludgate Hill. Prisoners awaiting trial at this court are transferred to Newgate for the sake of convenience whilst the sessions here are sitting.

Old Believers. See RASKOLNIK.

Oldbury, a busy manufacturing town of Worcestershire, 5½ miles WNW. of Birmingham, stands in the midst of a rich mineral district, and has iron and steel works, besides factories for railway plant, edge-tools, chemicals, &c. Pop. (1851) 11,741; (1881) 18,841; (1891) 28,348. See J. Nichols' *History of Manceter Parish* (1791).

Oldcastle, SIR JOHN, once popularly known as the 'good Lord Cobham,' whose claim to distinction is that he was the first author and the first martyr among the English nobility, was born in the reign of Edward III.; the exact year is not known. He acquired the title of Lord Cobham by marriage with the heiress of the line, and signalised himself by the ardour of his attachment to the doctrines of Wyclif. At that time there was a party among the English nobles and gentry sincerely, even strongly, desirous of ecclesiastical reform, whose leader was 'old John of Gaunt—time-honoured Lancaster.' Oldcastle was active in the same cause, and took part in the presentation of a remonstrance to the English Commons on the subject of the corruptions of the church. At his own expense he got Wyclif's works transcribed, and widely disseminated among the people, and paid a large body of preachers to propagate the views of the Reformer throughout the country. In 1411, during the reign of Henry IV., he commanded an English army in France, and forced the Duke of Orleans to raise the siege of Paris; but in 1413, just after the accession of Henry V., he was examined by Archbishop Arundel, and condemned as a heretic. He escaped from the Tower into Wales, but after four years' hiding was captured. He was brought to London, and—being reckoned a traitor as well as a heretic—was hung up in chains alive upon a gallows, and, fire being put under him, was burned to death, December 1417. Oldcastle wrote *Twelve Conclusions addressed to the Parliament of England,* several monkish rhymes against 'fleshlye livers' among the clergy, religious discourses, &c. Halliwell-Phillips first proved in 1841 that Shakespeare's Sir John Falstaff was originally Sir John Oldcastle—a view endorsed in Gairdner and Spedding's *Studies* (1881).

Old Catholics (Ger. *Altkatholiken*) is the title assumed by a number of Catholics who at Munich protested against the new dogma of the personal infallibility of the pope in all *ex cathedrâ* deliverances, proclaimed by the Vatican Council in 1870. It now applies to a communion or church in Germany and Switzerland, which has grown to be considerable in numbers and influence. The Munich protest by forty-four professors, Dr Döllinger and Professor Friedrich at their head, was directed against the binding authority of the Vatican Council and the validity of its decrees. To the Munich protest a number of Catholic professors at Bonn, Breslau, Freiburg, and Giessen declared their adhesion. The leaders of the movement met at the end of August at Nuremberg and drew up a declaration. The German bishops, though they had given warning of the dangerous consequences of the proclamation of the new dogma, submitted to the decision of the Vatican Council, and, in a pastoral letter of the 10th September 1870, called upon all members of the faculty of Catholic theology to signify their allegiance. Against the refractory (numerous professors and one priest) they proceeded by suspending them from their functions, and then by excommunication. The Prussian and Bavarian governments, however, took their respective subjects, the objects of those measures, under their protection.

At first the mass of the priests and laity showed very little sympathy with the movement, only two country congregations declaring their dissent from the decree of the Vatican Council. Pamphlets and appeals issued by the heads of the party elicited but little response. Local committees in furtherance of the cause were, however, formed in towns of Bavaria and the Rhine country. At a general Old Catholic Congress, held in 1871 at Munich, it was resolved to draw the bonds of union close with the church of Utrecht, the Jansenists (q.v.) of the Netherlands, which, under its archbishop and two bishops, offered to the Old Catholics the possibility of priestly consecration and confirmation. The congress, while carefully eschewing any decided breach with traditional dogma, and professing the desire simply to maintain the church as it stood before the 18th July 1870, propounded the far-reaching principle that the decisions of an ecumenical council, to be valid, must be in agreement with the existing faith of the Catholic people and with theological science. The hope was also expressed of a reunion with the Greek Oriental Church and a gradual understanding with the Protestants. Old Catholic congregations began to be formed in different towns of Bavaria and the Rhine country. In 1872 the Old Catholic priests in the German empire numbered about thirty. The Archbishop of Utrecht in July made a tour in Germany, holding religious service in Protestant churches and confirming the children of Old Catholics. At a second congress at Cologne, 1872, Professor Friedrich declared that the Old Catholic movement was now directed not merely against papal infallibility, but 'against the whole papal system, a system of errors during a thousand years, which had only reached its climax in the doctrine of infallibility.' Döllinger, the leader of the movement which led to the formation of the new

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communion, at first disapproved of the establishment of a new sect, but ultimately approved of the action of his friends. Yet till his death he never formally joined the community.

At Cologne in 1873 Professor Reinkens of Breslau was elected bishop of the Old Catholics in the ancient fashion, by 'clergy and people'—by all the Old Catholic priests and by representatives of the Old Catholic congregations. He was consecrated at Rotterdam by the bishop of Deventer, and formally acknowledged by the governments of Prussia, Baden, and Hesse. The Bavarian government declined to forbid Bishop Reinkens holding confirmations in their kingdom. The third congress at Constance in 1873 was taken up with 'synodal and communal regulations,' and with projects towards union with other Christian confessions. There were numerous guests present, Anglican, Russian, and German Protestant clergy. On the basis of the decrees of this congress the first Old Catholic Synod was held at Bonn in 1874, being composed of thirty priests and fifty-nine laymen. They laid down principles for reforms in general, abolished auricular confession and compulsory fasting, and appointed two commissions to draw up a new ritual in the vulgar tongue, and to frame a Catechism and a Bible History. A formula of agreement drawn up at another conference of 1875 failed to command the assent of Easterns or Anglicans. The third and fifth congresses (those of 1876 and 1878) permitted priests to marry, and yet fulfil all ministerial functions, in spite of Jansenist protests.

After 1875 the numbers of the Old Catholics rather declined. In 1883 there were in the German empire 34,800 Old Catholics, of whom 16,300 were in the Prussian dominions, and about fifty priests. In Switzerland Old Catholicism early took root, the government having from the first protected the priests excommunicated by the bishop of Basel; at Bern in 1874 a special Old Catholic theological faculty was established, and a bishop, Dr Eduard Herzog, was consecrated by Bishop Reinkens in 1876. There are Old Catholic congregations in Austria, but the communion is not growing anywhere. In France a somewhat similar movement was advocated by Père Hyacinthe (q.v.).

See DÖLLINGER; Miss Scarth's *Story of the Old Catholic and Kindred Movements* (1883); an article in the *Church Quarterly*, vol. xix. (1884–85); 'Döllinger and the Papacy,' in the *Quarterly* (1891); *Janus* (Eng. trans. 1869); and German works on Old Catholicism by Forster (1879), Bühler (1880), Beyschlag (1882), and Reinkens (1882).

Oldenbarneveldt. See BARNEVELDT.

Oldenburg, a grand-duchy of northern Germany, consisting of three distinct and widely separated territories—viz. Oldenburg Proper, the principality of Lübeck, and the principality of Birkenfeld. Total area, 2508 sq. m. (less than Devonshire); pop. (1885) 341,525. Oldenburg Proper, which comprises ⅞ths of this area, is bounded by the German Ocean and Hanover. The principal rivers are the Weser, the Jahde, and the Haase, Vehne, and other tributaries of the Ems. The country is flat, belonging to the great sandy plain of northern Germany, and consists for the most part of moors, heaths, marsh or fens, and sandy tracts. The occupations are mainly agricultural, with some iron-working, fisheries, and shipping; there is also a little wool-spinning and linen-weaving. The principality of Lübeck, consisting of the secularised territories of the former bishopric of the same name, does not contain the city (north of which it lies), and is surrounded by the duchy of Holstein. Its area is about 200 sq. m. The principality of Birkenfeld (q.v.) lies among the Hundsrück Mountains, in the very south of Rhenish Prussia, by which it is surrounded; its area is 192 square miles.

Oldenburg is a constitutional ducal monarchy. The constitution, which is based upon that of 1849, revised in 1852, is common to the three provinces, which are represented in one joint chamber. Each principality has, however, its special provincial council. The grand-duke has a civil list of £12,570, besides private revenues.

Oldenburg became an independent state in 1180. The family that then established its power has continued to rule to the present day, giving, moreover, new dynasties to the kingdom of Denmark, the empire of Russia, and the kingdom of Sweden. On the death, in 1667, of Count Anthony Gunther, the wisest and best of the Oldenburg rulers, his dominions fell to the Danish reigning family, and continued for a century to be ruled by viceroys nominated by the kings of Denmark. This union was, however, severed in 1773, when by a family compact Christian VII. made over his Oldenburg territories to the Grand-duke Paul of Russia, who represented the Holstein-Gottorp branch of the family. Paul having given up Oldenburg to his cousin, Frederick-Augustus, of the younger line of the House of Oldenburg, the emperor raised the united Oldenburg territories to the rank of a duchy. For a time the duchy was a member of Napoleon's Rhenish Confederation. The Lübeck territories were added in 1803; Birkenfeld at the Congress of Vienna, when Oldenburg became a grand-duchy. The grand-duchy concluded in 1866 a treaty with Prussia, by which the grand-duke renounced his claims to the Holstein succession. See SLESWICK-HOLSTEIN.

The capital, OLDENBURG, is pleasantly situated on the banks of the Hunte, 30 miles WNW. of Bremen by rail. It is the focus of the literary, scientific, and commercial activity of the duchy, and has a public library of 100,000 volumes, a picture-gallery, museum, &c. The grand-ducal palace is worthy of note for its fine gardens, its valuable pictures and other art collections, and its library. The principal church, St Lambert's (1270), contains the burying-vaults of the reigning family. Oldenburg is the seat of an active river-trade, and is noted for its great cattle and horse fairs. Pop. (1875) 15,701; (1890) 21,646. See Runde's *Oldenburgische Chronik* (3d ed. 1863).

Oldenburg, HENRY, a native of Bremen, born in 1626, was consul for his native city in London during the period of the Long Parliament and the protectorship of Cromwell. Besides being tutor to Lord Henry O'Brien and Lord William Cavendish, he was elected one of the very first members of the Royal Society, and, as assistant-secretary, edited its *Transactions* from 1664 to 1677, maintaining an extensive correspondence with Spinoza, Leibnitz, Bayle, and many other learned men of the age. Milton also knew him, and addressed him in the *Epistolæ Familiares*. Oldenburg died at Charlton, near Greenwich, in August 1678.

Oldham, a parliamentary, municipal, and county borough of Lancashire, on the Medlock, 7 miles NE. of Manchester, 5 SSE. of Rochdale, and 38 ENE. of Liverpool. It has grown since 1760 from a small village, such growth being due to its proximity to the Lancashire coalfields and to the marvellous extension of its cotton manufactures. It has nearly 300 mills, with more than 12 million spindles, which consume one-fifth of the total imports of cotton from abroad; and the other manufactures include fustians, velvets, silks, hats (once a leading industry), cords, &c., besides huge weaving-machine works, one employing 7000 hands. The town-hall (1841) is a good Grecian edifice, enlarged in 1879 at a cost of £29,000; and there

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are the lyceum (1854–80), a school of science and art (1865), public baths (1854), an infirmary (1870–77), and the Alexandra Park of 72 acres (1865). Oldham received its charter of incorporation in 1849. It was enfranchised by the Reform Bill of 1832, and returns two members, the parliamentary borough (which extends into Ashton-under-Lyne parish) covering 19¼ sq. m., the municipal only 7⅞. Pop. of the former (1881) 152,513; of the latter (1801) 12,024; (1841) 42,595; (1881) 111,343; (1891) 131,463.

Oldhamia, a genus of fossils of unknown affinities met with in the Cambrian system. Oldhamia assumes various forms, sometimes consisting of short radiating branches or umbels, which spring at regular intervals from a central thread-like axis; at other times the branches radiate in all directions from a central point. Some palæontologists have supposed the fossil to be a Sertularian zoophyte; others have referred it to the polyzoa; while yet others think it may be a seaweed. Possibly it is not a fossil at all, but merely an inorganic structure.

Oldhaven Beds. See EOCENE SYSTEM.

Oldmixon, JOHN (1673–1742), author of dull histories of England, Scotland, Ireland, and America, and of works on logic and rhetoric, is known chiefly as one of the heroes of Pope's *Dunciad.*

Old Mortality. See PATERSON (ROBERT).

Old Point Comfort, a village and watering-place of Virginia, at the mouth of James River, on Hampton Roads, is the site of Fortress Monroe.

Old Red Sandstone and Devonian System, the name given to certain series of strata that are intermediate in age between the Silurian and Carboniferous systems. These, known respectively as 'Old Red Sandstone' and 'Devonian,' are nowhere seen together, but the one is believed to be the equivalent of the other.

Old Red Sandstone.—This series, which underlies the Carboniferous system, was so called to distinguish it from another set of red sandstones which rests upon the Carboniferous strata, and was formerly known as the *New Red Sandstone* (see PERMIAN, and TRIASSIC). In the British Islands the Old Red Sandstone is confined to Scotland, Wales, and Ireland. In Scotland it comprises two groups of strata, the upper resting unconformably on the lower. The *lower group* attains a great thickness (20,000 feet as a maximum), and consists of coarse red, gray, brown, and purplish and sometimes yellowish sandstones, gray flagstones, clays, and shales, coarse conglomerates, and local beds of limestone and cornstone. Associated with these strata are interbedded lavas (porphyrites, diabase, &c.) and tuffs, which in some regions (Sidlaws, Ochils, Pentlands, Cheviots, Ayrshire, &c.) reach several thousand feet in thickness. The fossils of the Lower Old Red Sandstone consist chiefly of fishes and crustaceans and badly-preserved plants, which are mostly lycopodiaceous. In Lanarkshire a thin bed of shale in the group has yielded a few Upper Silurian fossils. The *upper group* comprises red sandstones, clays, conglomerates, and breccias, the sandstones in some areas being gray, yellow, or white. Few fossils occur, and these are chiefly the remains of ganoid fishes. In Arran the group contains a limestone which has yielded marine Carboniferous fossils. In some places this group passes upwards conformably into the lower member of the Carboniferous system.

In Wales the Old Red Sandstone appears to graduate downwards into the Upper Silurian, and to be likewise conformable with the overlying Carboniferous strata. In Ireland, as in Scotland, there appears to be an unconformity between the upper and lower groups of the series, the former passing conformably upwards into the Carboniferous, and the latter ('Glengariff Grits') graduating downwards into the Upper Silurian.

In Scotland the Old Red Sandstone strata are developed chiefly in the Lowlands, but here and there they rise to considerable elevations. They flank the Palæozoic strata of the southern uplands and the Highlands, and are probably more or less continuous underneath the overlying Carboniferous strata throughout the whole breadth of central Scotland. Other wide areas occur in the lower basin of the Tweed, along the borders of the Moray Firth, in Caithness, Orkney Islands, &c. In Wales the Old Red Sandstone is well developed in the region watered by the Usk and the Wye. In Ireland it is met with chiefly in the west and south-west.

Devonian.—In Devon and Cornwall we meet with a very different series of strata occupying the same stratigraphical position as the Old Red Sandstone. The Devonian strata pass up conformably into the Carboniferous system, but the base of the series is not seen, so that the relation of the strata to the Silurian is not known. The English Devonian probably does not exceed 10,000 or 12,000 feet in thickness. It consists of three groups (Lower, Middle, and Upper), the rocks being principally gray and brown slates, brown, yellow, red, and purple sandstones, grits, conglomerates, calcareous slates, and limestones. The calcareous members of the series are generally well charged with fossils of marine types, and are developed chiefly in the middle group.

Devonian rocks occupy wide areas at the surface on the Continent. They appear in the north of France, and extend from the Boulonnais eastwards through Belgium to Westphalia. In northern Russia they extend over more than 7000 miles, and crop up along the flanks of the Urals. But the areas exposed to view probably bear but a small proportion to those which lie buried underneath later formations. In central Europe the strata have the general aspect of the English Devonian, and contain relics of the same marine fauna. In Russia the strata are remarkable for showing alternations of calcareous and arenaceous rocks—the former of which contain an assemblage of fossils of a Devonian facies, while the latter are charged with the remains of a fish fauna resembling that of the Scottish Old Red Sandstone. It may be noted that volcanic rocks are here and there associated with the Devonian strata of central Europe. In North America both types of strata appear; the arenaceous type occurring in Nova Scotia and New Brunswick, while the Devonian type is met with in the state of New York and the Appalachian region, and is largely developed in the Mississippi basin.

Life of the Period.—Fucoidal markings are not uncommon in the Devonian strata, but land-plants rarely occur. These latter, however, are met with now and again in the Old Red Sandstone, more especially in that of Nova Scotia and New Brunswick. The chief forms are tree-ferns and small herbaceous ferns, lycopods (lepidodendroids), great horsetails (Calamites), and sigillarioids. The vegetation would thus appear to have been for the most part flowerless. Here and there, however, remains of large conifers have been detected. Among the lower forms of life that swarmed in the seas of the period were rugose and tabulate corals. Of the former the most characteristic were Cyathophyllum, Cystiphyllum, Calceola, &c., while the honeycomb corals (Favosites) are the most common of the tabulate forms. Echinoderms abounded, especially crinoids (Cupressocrinus, Cyathocrinus) and pentrem-

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ites. Trilobites, which formed so marked a feature in the life of the Silurian seas, were now reduced in number and variety—among the more notable forms being Phacops, Homalonotus, and Bronteus. Some of the eurypterids (most of which are small) attained a large size, one of these (Pterygotus) being 5 or 6 feet long. They occur chiefly in the Old Red Sandstone. From the same strata in North America have come the remains of insects—neuropteroid and orthopteroid wings of ancestral forms of May-fly, &c. Myriopods have also been recognised. Brachiopods are among the most common Devonian fossils; indeed this group appears to have reached its maximum development in the seas of that period. Very characteristic forms are Uncites, Stringocephalus, and Rensseleria. Lamellibranchs were well represented, some of the notable genera being Pterinea, Megalodon, Cucullæa, Avicula, &c. The marine gasteropods call for no particular mention, for they belong chiefly to types which had come down from earlier Palæozoic times. One may note, however, that the earliest pulmonates (Snails, &c.) come from the Old Red Sandstone. The straight Orthoceras and other old genera of cephalopods continued to flourish, but coiled forms (Clymenia, Goniatites) began to predominate in Devonian times. From the Old Red Sandstone chiefly come the remains of numerous ganoid fishes—a group feebly represented in existing waters. Among these are the placoganoids Cephalaspis, Pteraspis, Pterichthys, and Coccosteus, and the lepidoganoids Osteolepis, Diplopterus, Holoptychius, Acanthodes, &c. The largest placoganoid was the Dinichthys of North America—the armoured head of which was 3 feet in length. According to Dr Newberry, this fish was probably not less than 15 feet long, 'encased in armour, and provided with formidable jaws, which would have severed the body of a man as easily as he bites off a radish.' Other forms (such as Dipterus, and possibly Phaneropleuron) appear to have relations with the modern mud-fish (Ceratodus) of Australia.

It is obvious that in the Old Red Sandstone and Devonian we have two distinct types of sedimentation; the two series must have accumulated under different physical conditions. The Devonian strata are unquestionably of marine origin, while the Old Red Sandstone beds are believed to have been deposited in large lakes or inland seas. Hence we meet with the latter in a few more or less isolated basins, while the former extends over enormous regions. From the geographical distribution of the marine Devonian in Europe we gather that during the period in question the sea covered the south of England and the north-east of France, whence it extended eastwards, occupying the major portion of central Europe, and sweeping north-east through Russia, and how much farther we cannot tell. North of that sea stretched a wide land surface, in the hollows of which lay great lakes and inland seas, which seem now and again to have communicated with the ocean. It was in these broad sheets of water that the Old Red Sandstone strata were accumulated. Several of these old lakes in Scotland were traversed by lines of volcanoes, the relics of which are seen in many of the hill-ranges of the central and southern regions of that country. Volcanic action also at the same time manifested itself in some parts of Germany, but on a smaller scale apparently than in the Scottish area. The land, as we have seen, was clothed for the most part with a monotonous flowerless vegetation, but large pines grew on the higher and drier uplands, whence they were occasionally carried down by rivers to the lakes and seas. Very little is known of the terrestrial animal life of the period; most of the fossils met with in the lacustrine sediments of the period consisting of the remarkable ganoids and eurypterids already referred to. These (the fishes especially) appear to have abounded in the lakes, whence, however, they now and again descended by the rivers to the sea. The general facies and the geographical distribution of the life of the Devonian and Old Red Sandstone are suggestive of genial climatic conditions. Some geologists, however, have thought that the coarse breccias and conglomerates which occur in the Old Red Sandstone may be indicative of somewhat cold conditions; for these masses have often quite the aspect of morainic accumulations. It is possible, therefore, either that local glaciers may have existed in certain regions, or that the temperature may have been lowered for some time over wider areas. However that may be, the presence of the Devonian fauna in the Arctic regions seems to show that the temperature of the ocean must have been more equable in Devonian times than it is now.

Old Sarum. See SARUM.

Old Style. See CALENDAR.

Oldys, WILLIAM, an industrious bibliographer, was a natural son of Dr Oldys, Chancellor of Lincoln, and was born in 1696. The most of his life was spent as a bookseller's hack. He drank hard, and soon squandered the property left by his father, and when the dissolute old bookworm died (April 15, 1761) he left hardly enough to decently bury him. For about ten years Oldys acted as librarian to the Earl of Oxford, whose valuable collection of books and MSS. he arranged and catalogued, and by the Duke of Norfolk he was appointed Norroy King-of-arms. His chief works are *The British Librarian* (1737, anonymously); a *Life of Sir Walter Raleigh*, prefixed to Raleigh's *History of the World* (1738); *The Harleian Miscellany* (8 vols. 1753), besides many miscellaneous literary and bibliographical articles.

Oleaceæ, a natural order of exogenous plants, consisting of trees and shrubs, with opposite leaves, and flowers in racemes or panicles. Nearly 150 species are known, mostly natives of temperate countries. Among them are the olive, lilac, privet, phillyrea, fringe tree, &c. Between some of these there is a great dissimilarity, so that this order is apt to be regarded as a very heterogeneous group; but the real affinity of the species composing it is manifested by the fact that even those which seem most unlike can be grafted one upon another, as the lilac on the olive. Bitter, astringent, and tonic properties are prevalent in this order.

Oleander (*Nerium*), a genus of plants of the natural order Apocynaceæ. The species are evergreen shrubs with leathery leaves, which are opposite or in threes; the flowers in false umbels, terminal or axillary. The Common Oleander (*N. oleander*), a native of the south of Europe, the north of Africa, and many of the warmer temperate parts of Asia, is frequently planted in temperate countries as an ornamental shrub, and is not uncommon in Britain as a window-plant. It has beautiful red, or sometimes white flowers. The English call it Rose Bay, and the French Rose Laurel (*Laurier Rose*). It attains a height of eight or ten feet. Its flowers give a splendid appearance to many ruins in the south of Italy. It delights in moist situations, and is often found near streams. All parts of it contain a bitter and narcotic-acrid juice, poisonous to men and cattle, which flows out as a white milk when young twigs are broken off. Cases of poisoning have occurred by children eating its flowers, and even by the use of the wood for spits or skewers in roasting meat. Its exhalations are injurious to those who remain long under their influence, particularly to those who sleep under it. A decoction of the leaves or bark is much used in

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the south of France as a wash to cure cutaneous maladies. *N. odoratum*, an Indian species, has larger flowers, which are very fragrant. *N. piscidium* (or *Eschaltum piscidium*), a perennial

Common Oleander (*Nerium oleander*).

climber, a native of the Khasia Hills, has a very fibrous bark, the fibre of which is used in India as hemp. The steeping of the stems in ponds kills fish.

Oleaster. See ELÆAGNUS.

Ole Bull. See BULL.

Olefiant Gas, or ETHYLENE, C_2H_4, is the most abundant illuminating constituent in coal-gas. It may be obtained by the destructive distillation of coal, but more readily by the action of sulphuric acid on alcohol. It is a colourless gas with a faint odour, but little soluble in water or alcohol. It may be liquefied by cold and pressure. With air it forms a powerfully explosive mixture, which, on being burned, yields water and carbonic acid gas. When mixed with an equal volume of chlorine, and kept cool and in the dark, the two gases unite, with the production of drops of an oily liquid called Dutch Liquid (q.v.).

Olefines. See HYDROCARBONS.

Oleic Acid is one of the acids present in olive, almond, and other oils, in which it is united to glycerine. At temperatures above 57° (14° C.) it exists as a colourless limpid fluid, of an oily consistence, devoid of smell and taste, and (if it has not been exposed to air) exerting no action on vegetable colours. At 40° (4·4° C.) it solidifies into a firm, white, crystalline mass, and in this state it undergoes no change in the air; but when fluid it readily absorbs oxygen, becomes yellow and rancid, and exhibits a strong acid reaction with litmus paper. It is very difficult to obtain the acid in a state of purity, in consequence of the readiness with which it oxidises. It is obtained in a crude form, as a secondary product, in the manufacture of stearin candles; but when the pure acid is required a lengthy process, starting with almond oil, must be adopted. Oleic acid forms normal (or neutral) and acid salts; but the first compounds of this class that require notice are the normal salts of the alkalies. These are all soluble, and by the evaporation of their aqueous solution form *soaps*. Oleate of potash forms a soft soap, which is the chief ingredient in Naples soap; while oleate of soda is a hard soap, which enters largely into the composition of Marseilles soap. Of recent years a large number of oleates have come into use in medicine, which depend for their activity on the remarkable ease with which they are absorbed by the skin. Such are the oleates of zinc, mercury, lead, tin, morphia, &c., which, in this form, produce more rapid results than when applied as ointments.

Olein is a compound of oleic acid with glycerine, and constitutes the bulk of olive-oil. Along with it are associated stearin and palmitin, similar compounds of stearic and palmitic acids with glycerine.

Olenus, a genus of Cambrian trilobites highly characteristic of the upper members of the system.

Oleograph. This is a name given to an ordinary chromo-lithograph which has been 'roughed' after printing, mounted on canvas, and varnished so as to imitate an oil-painting. See LITHOGRAPHY.

Oleomargarine. See BUTTER.

Oleometer, or ELAÏOMETER, an areometer or balance for ascertaining the densities of fixed oils. It consists of a very delicate thermometer-tube, the bulb being large in proportion to the stem, so weighted and graduated as to adapt it to the densities of the leading fixed oils. On the scale is marked the principal oils of commerce, with their specific gravity opposite. The standard temperature of the oleometer is 59° F. Those in general use are Gobby's and Lefebre's oleometers, Fisher's oil-balance, and Brix's areometer for lighter liquids.

Oléron (anc. *Uliarus*), an island lying 2 to 10 miles off the west coast of France, and forming part of the department of Charente-Inférieure. It is 19 miles long by about 5 broad, and is unusually fertile. Pop. 17,720, mostly Protestants. On Oléron are the port of Le Château, and the small towns of St Pierre d'Oléron and St Georges d'Oléron.

The Laws or Judgments of Oléron were a code of maritime law compiled at the instance of Eleanor of Guienne before she married Henry II. of England, modelled on the *Book of the Consulate of the Sea* (a maritime code regulating commerce in the Levant), but drawn from the decisions of the maritime court of Oléron, in the duchy of Guienne. It was intended for the use of mariners in the Atlantic waters, was introduced into England in the end of the 12th century and into Flanders in the 13th. The usages and decisions upon which it was based were those observed in the wine and oil trade between Guienne and the ports of England, Normandy, and Flanders. An English translation was published as *Rutter of the Sea*, by T. Petyt in 1536. See INTERNATIONAL LAW.

Olga, ST, a saint of the Russian Church, wife of the Scandinavian (Varangian) Duke Igor of Kieff, who, after her husband's death (946), governed during the minority of her son, till 955. Thereafter she repaired to Constantinople, and was baptised, assuming the name of Helena. Returning to Russia, she laboured with much zeal for the propagation of her new creed. After her death (968) she was canonised, and is now held in high veneration in the Russian Church. Her festival is held on July 21.

Olib'anum, a gum-resin which flows from incisions in several species of Boswellia, growing on bare limestone rocks in the mountains of Somali Land and the south of Arabia. These trees send their roots to a great depth into the crevices of the rock (see BOSWELLIA; and an exhaustive memoir on this gum-resin by Sir George Birdwood, published in the *Linnean Transactions*, xxvii. p. 111). Olibanum is the *Lebonah* of the Hebrews, *Libanos* or *Libanotos* of the Greeks, *Thus* of the Romans, of all which terms the ordinary English translation is Frankincense (q.v.). It

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occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverised; and diffuses a strong aromatic odour when burned. It was formerly used in medicine, chiefly to restrain excessive mucous discharges; but its use for such purposes is now rare. It sometimes enters as an ingredient into stimulating plasters. It is chiefly employed for fumigation, and is used as incense in Roman Catholic churches and Indian temples. Its odour is obnoxious to mosquitoes and other insects. The inner layers of the bast of *B. frereana* are transparent, resembling oiled paper, and are used by the natives for writing on. Aden is the great port where it is chiefly received. The imports there in 1888 were 16,248 cwt. of ordinary olibanum and 3600 cwt. of that termed Mayeti, the name of the port from which it is received in Somali Land. This is the produce of *B. frereana*, and much resembles Tacamahac. The exports of olibanum from Aden in 1888 were 23,000 cwt. In India, where it is much used, the imports increase year by year, and reached 26,680 cwt. in 1888. Some is sent to China, and about 17,000 cwt. comes to England, valued at about £41,000.

Olifant River, a forked stream of Cape Colony, rises in the mountains north-east of Capetown, and, after a north-westerly course of 150 miles, enters the Atlantic. Area of drainage basin, 13,000 sq. m.—Another stream bearing the same name rises in the Transvaal, and goes east to join the Limpopo.

Oligarchy (*oligos*, 'few,' and *archo*, 'I govern'), a term applied by Greek political writers to that perversion of an aristocracy in which the efforts of the dominant and ruling party are chiefly devoted to their own aggrandisement and the extension of their power and privileges. Thus it bears the same relation to aristocracy that despotism does to monarchy and ochlocracy to democracy.

Olig'ocene System. The British strata belonging to this system occur only in Hampshire, the Isle of Wight, and Devonshire. The series is as follows:

4. Hempstead Beds: fresh-water marls and clays overlaid by marine septarian clays. About 260 feet.
3. Bembridge Beds: marls and limestone; fresh-water below, estuarine above. About 110 feet.
2. Osborne Beds: fresh-water clays, marls, sands, and limestone. About 100 feet.
1. Headon Beds: variable series of clays, marls, sands, and limestones. The lower division is of fresh- and brackish-water origin; the middle partly marine, partly fresh-water; the upper fresh-water. About 150 feet.

Usually included as Oligocene are the lacustrine beds of Bovey Tracey in Devonshire, consisting of sands and clays with lignites. Between the basalt-beds that compose the denuded plateaus of Antrim and the Inner Hebrides (Mull, &c.) occur thin layers of clay and lignite—the so-called *leaf-beds*—which are probably of the same age.

Foreign Equivalents.—Oligocene strata, chiefly of fresh- and brackish-water origin, but containing intercalations of marine beds, overlie the Eocene of the Paris basin and that of Belgium. They likewise appear in Germany, where they form the oldest Tertiary deposits—no Eocene having yet been detected in that region. The German Oligocene is mainly of fresh-water origin in its lower and upper portions, while marine deposits predominate in the middle of the series. It is noted for its beds of lignite or brown coal. In Switzerland the Oligocene attains a thickness of several thousand feet, chiefly conglomerates and sandstones, known as *Molasse*, and mostly of fresh-water origin; the basal portions, however, are marine and brackish-water. Other areas of fresh-water Oligocene more or less notable are met with in Alsace, Breisgau, and Würtemberg. In Auvergne, central France, lacustrine deposits of the same age are well developed, and, like most of the Oligocene strata, have yielded great numbers of organic remains.

Life of the Period.—The flora of Oligocene times was abundant and varied. Palm-trees (Sabal, Flabellaria), both large and small, seem to have grown over all Europe. Amongst conifers were various American types (Libocedrus, Chamæcyparis, Sequoia, Taxodium) and other forms, such as Glyptostrobus, like *G. heterophyllus* of Japan and China, Widdringtonia, a genus now found only in South Africa and Madagascar. There were also proteaceous plants (Dryandra) of Australian affinities, and species of custard-apple, gum-tree, spindle-tree, maple, acacia, mimosa, lotus, aralia, camphor-tree, cinnamon-tree, evergreen oak, laurel, &c., besides such familiar forms as birch, hornbeam, elder, elm, poplar, walnut, &c. Evergreens were the prevalent forms. The invertebrate fauna needs but little notice. Amongst notable molluscs were volutes, cowries, olives, cones, spindle-shells, &c. Cerithium was particularly plentiful in the estuaries of the period; while lamellibranchs were well represented by modern types of marine and fresh-water habitats. Amongst the birds common in Europe were paroquets, trogons, marabouts, cranes, flamingoes, ibises, pelicans, eagles, secretary-birds, sand-grouse, &c. At the beginning of the period many mammals of extinct types lived in Europe, such as Palæotherium and Anchitherium, survivals from the Eocene; certain transitional forms of ungulates, such as Cainotherium (a small animal somewhat resembling the living chevrotains in outward appearance), Xiphodon (a slenderly built deer-like animal), and Anoplotherium (a long-tailed animal about the size of an ass, with two toes on each foot); various tapiroid animals, small rhinoceroses, Hyænodon (a carnivore), also forms of squirrel, civet, martin, mole, musk-rat, &c.

Physical Conditions.—During Oligocene times a wide land surface appears to have extended over all the British area. In the region lying between what is now Antrim and the west coast of Scotland great fissure-eruptions took place, and sheet after sheet of basalt was poured out, so as eventually to form broad plateaus that extended northwards beyond Skye. In the intervals between successive eruptions these plateaus became clothed with vegetation, the debris of which has been here and there preserved in the deposits of shallow lakes that dotted the surface of the volcanic country. It is probable that at this time there was land-connection between Europe and North America by way of the Faroe Islands and Iceland, in both of which tracts similar basaltic plateaus occur, containing intercalated layers of lignite, &c. like those of Antrim and the Western Islands of Scotland. The Oligocene strata of the south of England and the Franco-Belgian area are evidence that the sea or estuarine waters which occupied that region in Eocene times (see Eocene System) were gradually silted up. In Germany there existed great fresh-water lakes, fringed by wide marsh-lands and by dense forests of a subtropical character. As the lakes became partially silted or dried up vegetation encroached upon their deserted beds, only to be buried under fresh accumulations of sand and mud when the water had again risen. That these lakes were now and again in direct communication with the sea is shown by the occurrence of thick layers of marine origin intercalated amongst the fresh-water beds. For some time, indeed, the lacustrine areas were entirely usurped by the sea, which may have entered them from submerged regions in the east of Europe. In Switzerland, in like manner, we have evidence of changing conditions. At first the sea covered a considerable

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portion of the country, but eventually it disappeared, and its place was taken by a series of brackish-water lagoons and fresh-water lakes. The deposits accumulated in those lakes now form considerable mountains at the base of the Alps (Rigi, Rossberg). In central France, as in Germany, lacustrine conditions were characteristic of the period, one or more great lakes having occupied a considerable area in Auvergne. In southern Europe the Mediterranean had withdrawn from wide regions which were deeply submerged by it in Eocene times, but it still covered a more extensive area than at present. The climate of the Oligocene period was uniformly genial, but hardly so tropical as that of the preceding period. See EOCENE SYSTEM.

Oligoclase. See FELSPAR.

Olinda, a city of Brazil, 4 miles NE. of Pernambuco. Pop. 7000.

Oliphant, LAURENCE, traveller, novelist, and mystic, was born in 1829, son of Sir Anthony Oliphant, Chief-justice of Ceylon. In early youth he travelled with Jung Bahadur to Nepal, and after his return was admitted a member of the Scottish bar, and later of the English bar at Lincoln's Inn. His first work, *A Journey to Khatmandu* (1852), was followed by *The Russian Shores of the Black Sea* (1853), the fruit of his travels in Russia in 1852. He next became private secretary to the Earl of Elgin, Governor-general of Canada, whom later he accompanied on his special embassy to China, thus finding material for his books *Minnesota and the Far West* (1855) and *A Narrative of the Earl of Elgin's Mission to China and Japan in 1857–59* (1860). In 1861, while acting as Chargé d'Affaires in Japan, he was severely wounded by assassins, and consequently resigned his post. From 1865 to 1868 he sat in parliament for the Stirling burghs. Having become profoundly influenced by certain peculiar religious opinions, he renounced London society, joined for a time the community of T. L. Harris (q.v.) in the United States, and finally settled at Haifa (q.v.) in Palestine. He died at Twickenham, 23d December 1888. The religious opinions of his later years he gave to the world in *Sympneumata* (1886) and *Scientific Religion* (1888), as well as in his novel *Masollam* (1886), while they already formed the background of his earlier novel, *Altiora Peto* (1883). Oliphant, when he subjected his intellect to occultism, brought a bright career to an abrupt conclusion, and flung away a rare literary endowment. His *Piccadilly* (1870) was a book of altogether exceptional promise, bright with wit, delicate irony, and, above all, individuality; but its promise was never fulfilled.

Other books of Oliphant's were *The Transcaucasian Campaign under Omar Pasha* (1856); *Patriots and Filibusters* (1860); *The Land of Gilead* (1881); *Traits and Travesties, Social and Political* (1882); *The Land of Khemi* (1882); *Haifa* (1887); and *Episodes in a Life of Adventure* (1887). See his Life by Mrs Oliphant.

Oliphant, MRS MARGARET (*née* WILSON), one of the most distinguished of modern female novelists, was born in 1828 at Wallyford, near Musselburgh, Midlothian. In 1849 she published her first work, *Passages in the Life of Mrs Margaret Maitland*, which instantly won attention and approval. Its most distinctive charm is the tender humour and insight which regulate its exquisite delineation of Scottish life and character at once in their higher and lower levels. This work was followed by *Caleb Field* (1850), *Merkland* (1850), *Adam Graeme* (1852), *Harry Muir* (1853), *Magdalen Hepburn* (1854), *Lilliesleaf* (1855), and *Katie Stewart* (1852), *The Quiet Heart* (1854), *Zaidee* (1855), the last three of which originally appeared in succession in *Blackwood's Magazine*. Though these are of somewhat various merit, in all of them the peculiar talent of the writer is marked. They are rich in the minute detail which is dear to the womanly mind; have nice and subtle insights into character, a flavour of quiet humour, and frequent traits of delicacy and pathos in the treatment of the gentler emotions. It was, however, by the *Chronicles of Carlingford* (first published in *Blackwood's*, 1861–64) that her reputation as a novelist was first secured. In the first of them, *The Doctor's Family*, the character of little Netty, the heroine, vivifies the whole work, and may rank as an original creation. The next in the series, *Salem Chapel*, perhaps indicates a wider and more vigorous grasp than is to be found in any other work of the authoress. Certain of the unlovelier features of English dissent, as exhibited in a small provincial community, are here graphically sketched, and adapted with admirable skill to the purposes of fiction. After more than forty years of novel-writing Mrs Oliphant's powers show no decadence. She still possesses the old art of interesting her readers; there is still the same fidelity to truth in the minor details of her novels. Mrs Oliphant has been resident at Windsor for many years. A civil list pension of £100 was conferred upon her in 1868.

Her other works include *Agnes* (1865); *Madonna Mary* (1866); *The Minister's Wife* (1869); *John* and *Three Brothers* (1870); *Squire Arden* (1871); *Ombra* (1872); *A Rose in June* (1874); *Phœbe Junior* (1876); *The Primrose Path* (1878); *Within the Precincts* (1879); *He that Will Not when He May* (1880); *In Trust* (1882); *The Ladies Lindores* and *It was a Lover and his Lass* (1883); *Hester, The Wizard's Son*, and *Sir Tom* (1884); *Madam* and *Two Stories of the Seen and Unseen* (1885); *House Divided against Itself* (1886); *A Country Gentleman* and *The Son of his Father* (1887); *The Second Son* and *Joyce* (1888); *Neighbours on the Green, Lady Car*, and *A Poor Gentleman* (1889); *The Duke's Daughter* and *Kirsteen* (1890). Her more important contributions to general literature have been *Life of Edward Irving* (1862); *Historical Sketches of the Reign of George II.* (1869); *St Francis of Assisi* (1871); *Memoir of the Comte de Montalembert* (1872); *The Makers of Florence* (1876); *Dress* (1878); *The Literary History of England*, from 1790 to 1825 (1882); *A Little Pilgrim: in the Unseen* (1882); *The Makers of Venice* (1888); *Dante* and *Cervantes* in the series of 'Foreign Classics for English Readers,' for which she has also acted as editor; *Memoir of Principal Tulloch* (1888); *Royal Edinburgh* (1890); and *Life of Laurence Oliphant* (1891).

Olivarez, GASPARO DE GUZMAN, COUNT OF, Duke of San Lucar, the favourite of Philip IV. of Spain, was born on January 6, 1587, at Rome, where his father was ambassador. He belonged to a distinguished but impoverished family, received a learned education, and became the friend of Philip IV., his confidant in his amours, and afterwards his prime-minister, in which capacity he exercised almost unlimited power for twenty-two years. Olivarez showed ability for government; but his constant endeavour was to wring money from the country that he might carry on wars against Portugal, France, and the Netherlands. His attempts to rob the people of their time-honoured privileges provoked insurrections in Catalonia and Andalusia, and roused the Portuguese to shake off the Spanish yoke in 1640. But the continued ill-success of the arms of Spain at length thoroughly roused the nation, and the king was obliged to dismiss his favourite in 1643. He was ordered to retire to Toro (Zamora), and died there, 22d July 1645. See De la Rocca, *Histoire du Ministère du Comte-Duc d'Olivares* (1673).

Olive (*Olea*), a genus of trees and shrubs of the natural order Oleaceæ, having opposite, evergreen, leathery leaves, which are generally entire, smooth, and minutely scaly. The general character of the

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genus is well illustrated by the accompanying cut. The species are widely distributed in the warmer temperate parts of the globe. The Common Olive (*O. Europæa*), a native of Syria and other Asiatic countries, is in its wild state a thorny shrub or small tree, but through cultivation becomes a tree of 20 to 30 feet high, destitute of spines. It attains a prodigious age; some plantations, as those at Terni, in Italy, are supposed to have existed from

Common Olive (*Olea Europæa*), Branch in Flower: *a*, ripe fruit; *b*, section of same showing stone. (Bentley and Trimen.)

the time of Pliny. Some trees in Turkey are credited with an age of 1200 years. There are two varieties of the common olive, one having narrow, willow-like leaves, gray green above and silvery below. In the other the leaves are similar in all respects, only much broader. The latter has also much the larger fruit of the two, but the oil it yields is rank and coarse to the palate, and is rarely used on the Continent out of Spain, in which country it is the variety chiefly cultivated. The narrow-leaved variety is preferred by the French and Italian olive-growers, the more bland and agreeable oil from which is better appreciated, especially by the British. Olive-oil may be said to form the cream and the butter of Spain and Italy, as it takes the place of those products of milk in the cookery and table uses of those countries. Being highly nutritious, it is also regarded as more wholesome than animal fats in warm climates. The finest quality of olive-oil is obtained from Leghorn. The oil is contained in the fleshy part of the fruit—not in the seed—from which it is extracted by pressure. The fruit when ripe is crushed to a paste. It is then put into woollen bags and subjected to pressure moderately. Thus is obtained in considerable quantity the finest quality of oil, which is named 'Virgin Oil.' The pulp is then moistened with water and again pressed, the result being an oil of inferior quality, yet quite fit for table purposes. A further residue of oil is extracted from the pulp after it has been steeped in water; but it is only fit for soap-making and other manufacturing purposes (see OILS, and COTTON-SEED OIL). Unripe olives are pickled both for consumption in the countries in which they are grown and for exportation to other countries. The best pickled olives come from Genoa and Marseilles to England, but quantities are also imported from Languedoc, Leghorn, and Naples. They are eaten abroad before meals as a whet to the appetite, and in England at dessert with wine to restore the palate and as a digestive. Dried olives are also used for the same purposes, as well as pickled olives. The wood is much prized by cabinet-makers, being beautiful in colour and grain, and capable of taking a fine polish; that of the root is most in demand for the making of snuff-boxes and ornaments.

The olive has been cultivated in the East from the remotest times, is associated with much mythical lore, and has been regarded in all ages as the bounteous gift of heaven, as the emblem of peace and plenty, and the highest reward that could be given to the honourable and the brave. The area devoted to olive-culture in Italy is stated at about 2¼ million acres, and the total production of olive-oil is some 90 million gallons. The olive is also largely cultivated in Turkey and the Levant, in Morocco and Tripoli, as well as Spain; and some attention is being paid to its culture in South Australia. It grows luxuriantly in Chili, whither it was brought by the Spaniards. Jesuit missionaries introduced it into Mexico in the 17th century, and into California, where it grows freely. It has also been grown in Florida and other southern states. The culture of the olive has been attempted in England, but without success. Against south walls it lives, with slight protection in winter, in the neighbourhood of London, and in the same way it produces fruit in exceptionally favourable seasons in Devonshire; but it is generally unsuited to the British climate. Even in those countries in which its culture may be profitably pursued the tree is somewhat fastidious as to soil, aspect, and position. It does not succeed well in elevated situations, prefers sloping ground facing and not far removed from the sea, and thrives best in calcareous soil. It is very generally propagated by suckers, but where great care is bestowed on it inarching is practised. It bears an abundant crop only once in several years. There are other species of Olea more remarkable for the hardness and usefulness of their timber than for their fruits. *O. verrucosa*, *O. capensis*, and *O. laurifolia*, natives of the Cape of Good Hope, are small trees or shrubs with wood of such density and toughness as to rival in strength and durability iron itself, and they are all named Ironwood by the colonists. The fruit of some of these is eatable. The fruit of *O. americana* is also eatable. The Fragrant Olive of Japan and China—*O.* (*Osmanthus* of some) *fragrans*—is a handsome shrub with sweet-scented flowers, which are said to be used by the Chinese for flavouring some kinds of tea. See A. T. Marvin, *The Olive: its Culture in Theory and Practice* (San Francisco, 1888); and United States Consular Report (1890).

Olive, PRINCESS, the title assumed in 1820 by an impudent pretender, Mrs Olivia Serres, who claimed to have been born at Warwick on 3d April 1772, the granddaughter of the Rev. Dr Wilmot, her mother being his only daughter, her father Henry Frederick, Duke of Cumberland, the youngest brother of George III. In 1791 she had married John Thomas Serres, painter, but had separated from him in 1803; and between 1805 and 1819 she had published ten trashy volumes of poetry and fiction. She resembled the royal family, and found some people ready to believe her to be really Princess of Cumberland and Duchess of Lancaster; but she died in poverty, within the 'rules' of the King's Bench, in November 1834. Lavinia, the elder of two daughters by her husband (there seems to have been at least one son by someone else), married Anthony Thomas Ryves, the adopted son of William Combe ('Dr Syntax'), only, however, also to separate. She died 7th December 1871, five years after a jury, in Ryves and Ryves *v.* the Attorney-general, had decided that Olive Serres was *not* the legitimate daughter of the Duke of

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Cumberland, and that eighty-two documents produced in evidence were forgeries.

See the *Life of John Thomas Serres* (1826); *Notes and Queries, passim*; and an article by E. Walford in the *Gentleman's Magazine* for August 1873.

Olivenite, a mineral, consisting chiefly of arsenic acid and protoxide of copper, with a little phosphoric acid and a little water. It is generally of some dark shade of green, sometimes brown or yellow. It is found along with different ores of copper in Cornwall and elsewhere. It is often crystallised in oblique four-sided prisms, of which the extremities are acutely bevelled, and the obtuse lateral edges sometimes truncated, or in acute double four-sided pyramids; it is sometimes also spherical, kidney-shaped, columnar, or fibrous, which latter variety is known as *wood-arseniate*, and is greenish gray in colour.

Olivenza, a fortified town of Spain, near the Portuguese frontier, 20 miles SSW. of Badajoz. Pop. 7759.

Oliver, the comrade in arms of Roland (q.v.).

Olives, MOUNT OF, called also MOUNT OLIVET, a limestone ridge, lying north and south on the east side of Jerusalem (q.v.), from which it is separated only by the narrow Valley of Jehosaphat. It is called by the modern Arabs Jebel-al-Tôr, and takes its familiar name from a magnificent grove of olive-trees which once stood on its western flank, but has now in great part disappeared. The road to Mount Olivet is through St Stephen's Gate. Immediately beyond, at the foot of the bridge over the brook Kedron, lies the Garden of Gethsemane; and the road here parts into two branches, northwards to Galilee, and eastwards to Jericho. The ridge rises in three principal summits, that to the north being 361 feet above Jerusalem (2725 above the sea), the central summit, crowned with a village (Olivet proper), 286, and the third summit on the south 46 feet. David fled from Absalom by way of the Mount of Olives, which was also the scene of the idolatrous worship established by Solomon. The northern peak is the supposed scene of the appearance of the angels to the disciples after the resurrection, and is remarkable in Jewish history as the place on which Titus formed his encampment in the expedition against the fated city of Jerusalem. But it is around the central peak, which is the Mount of Olives properly so called, that all the most sacred associations of Christian history converge. On the summit stands the Church of the Ascension, on the site of a church built by St Helena; and near it are shown the various places where, according to tradition, our Lord wept over Jerusalem, where the apostles composed the apostles' creed, where our Lord taught them the Lord's Prayer, &c. Near the Church of the Ascension is a mosque and the tomb of a Mohammedan saint.

Olivetans, a religious order of the Roman Catholic Church, whose full title is the Congregation of Our Lady of Mount Olivet. They are an offshoot of the Benedictine Order (q.v.), and were founded in 1313 by Giovanni Tolomei, a native of Siena, and professor of Philosophy in the university of that city, who believed himself to have been miraculously cured of blindness. The order was confirmed by pope John XXII., and Tolomei was chosen the first general.

Olivine. See CHRYSOLITE, IGNEOUS ROCKS.

Olla Podri'da (lit., 'putrid pot'), a Spanish national dish, consisting of flesh, fresh and salted, poultry, vegetables, &c., well seasoned with pepper and garlic, and stewed together in a closed pot. The term is applied figuratively to literary productions of very miscellaneous contents. The French equivalent is *pot-pourri*, and the Scotch *hotch-potch*, both of which, but especially the former, are also employed in a figurative sense.

Ollendorf's System, a method of learning languages, invented by H. G. Ollendorf (1803–65), and designed for those who teach themselves. The grammars are meant to give the student a mastery of the conversational forms of the language, grammatical rules being few.

Ollivier, OLIVIER ÉMILE, French statesman, was born at Marseilles on 2d July 1825, and, having studied law at Paris, began to practise as an advocate in that city. By clever pleading he established a reputation at the bar, and after 1864 acquired influence as a member of the Legislative Assembly. In 1865 the viceroy of Egypt appointed him to a high juridical office in that country. But he still took an active interest in French politics, and in January 1870 Napoleon III. charged him to form a constitutional ministry. But the real authority of the ministers was practically *nil*. Ollivier was an unsuspecting tool in the hands of the Imperialists. 'With a light heart' he rushed his country into the war with Germany, himself to be overthrown, after the first battles, on 9th August. He withdrew to Italy. Ollivier has written books on *Lamartine* (1874) and *Thiers* (1879), and *L'Église et l'État au Concile du Vatican* (2 vols. 1879), *Principes et Conduite* (1875), *Nouveau Manuel de Droit Ecclésiastique Français* (1885), and others.

Olmütz, a town and fortress of Moravia, Austria, on the March, 129 miles NNE. of Vienna. The country round can be laid under water, and during 1839–75 the old walls and moats were superseded by an outer cordon of forts. Chief buildings are the 14th-century cathedral (restored 1887); the church of St Maurice (1472), whose organ has 48 stops and 2342 pipes; the noble town-hall, with a steeple 255 feet high; the archiepiscopal palace; and the lofty Trinity column on the Oberring. The former university (1581–1855) is reduced to a theological faculty, with over 200 students and a library of 75,000 volumes. The trade is more important than the manufactures. Pop. 20,176. Olmütz, which in 1640 was superseded by Brünn as the capital of Moravia, suffered severely in both the Thirty and the Seven Years' Wars. In 1848 Ferdinand I. signed his abdication here. See the local history by W. Müller (Vienna, 1882).

Olney, a pleasant little town of Buckinghamshire, on the Ouse, 11 miles W. by N. of Bedford and 10 SE. of Northampton. At the corner of the market-place still stands the house where Cowper (q.v.) lived from 1767 to 1786, writing with John Newton the *Olney Hymns* (1779). The place besides has memories of Scott the commentator, William Carey, and many more missionaries. Brewing and bootmaking are industries. Pop. 2347. See Thomas Wright's *Town of Cowper* (1886).

Olonetz, a government of Russia, bounded W. by Finland, NE. by Archangel, and S. by Novgorod and St Petersburg. Area, 57,422 sq. m.; pop. (1883) 327,043. Forests cover 63½ per cent. of the total area. Petrosavodsk is the centre of administration.

Oloron, a town in the French department of Basses-Pyrénées, on the Gave d'Oloron, 22 miles by rail SW. of Pau. It has two interesting Romanesque churches. Pop. 7517.

Olshausen, HERMANN, theologian, was born at Oldeslohe in Holstein, 21st August 1796, studied at Kiel and at Berlin under Neander, and became professor at Berlin (1821), Königsberg (1827), and Erlangen (1834). He died 4th September 1839. His principal work was a complete commentary on the New Testament, completed by Ebrard and

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Wiesinger (1830 *et seq.*; Eng. trans. 4 vols. 1847–49; rev. ed. 6 vols. New York, 1856–58). His younger brother Justus (1800–82) was a distinguished Orientalist; and Theodore (1802–69) took a prominent part in the Sleswick-Holstein rising, 1848.

Olympia, the scene of the celebrated Olympic games, is a beautiful valley in Elis, in the Peloponnesus, through which runs the river Alpheus. As a national sanctuary of the Greeks, Olympia contained, within a small space, many of the choicest treasures of Greek art belonging to all periods and states, such as temples, monuments, altars, theatres, and multitudes of images, statues, and votive-offerings of brass and marble. In the time of the elder Pliny there still stood here about 3000 statues. The Sacred Grove (called the *Altis*) of Olympia enclosed a level space about 660 feet long by nearly 580 broad, containing the sanctuaries connected with the games. It was finely wooded, and in its centre stood a clump of sycamores. The Altis was crossed from west to east by a road called the 'Pompic Way,' along which all the processions passed. The Alpheus bounded it on the south, the Cladeus, a tributary of the former, on the west, and rocky but gently swelling hills on the north; westward it looked towards the Ionian Sea. The most celebrated building was the *Olympieion*, or *Olympium*, dedicated to Olympian Zeus. It was designed by the architect Libon of Elis in the 6th century B.C., but was not completed for more than a century. It contained a colossal statue of the god, the masterpiece of the sculptor Phidias, and many other splendid figures; its paintings were the work of Panænus, a relative of Phidias. Next to the Olympieion ranked the *Heræum*, dedicated to Hera, the wife of Zeus and Queen of Heaven, containing the table on which were placed the garlands prepared for the victors in the games. The *Pelopium*, the *Metroum*, the ten *Thesauri* or Treasuries, built for the reception of the dedicatory offerings of the Greek cities, the temples of Eileithyia and Aphrodite also deserve mention. The *Stadium* and the *Hippodrome*, where the contests took place, stood outside and east of the Altis; the Gymnasium and Palæstra were also outside and to the west. Explorations were undertaken in 1875 by the German government at an annual expense of £8000, and threw much light on the plans of the buildings. Many valuable sculptures, bronzes, coins, and other objects were discovered. The greatest find was the Hermes of Praxiteles, a most beautiful and marvellous piece of sculpture. The results of these excavations have been published officially in *Die Ausgrabungen zu Olympia* (5 vols. 1875–81, with 118 plates).

Olympic games were the most splendid national festival of the ancient Greeks, and were celebrated every fifth year in honour of Zeus, the father of the gods, on the plain of Olympia. Their origin goes back far beyond 776 B.C., the year in which the custom of reckoning time by Olympiads (q.v.) began. We may, however, believe that the games became a truly national festival for the first time in that year. At first, it is conjectured, only Peloponnesians resorted to the Olympic games, but gradually the other Greek states were attracted to them, and the festival became *Pan-Hellenic*. Originally, and for a long time, none were allowed to contend except those of pure Hellenic blood; but after the conquest of Greece by the Romans the latter sought and obtained this honour, and both Tiberius and Nero figure in the list of Roman victors. Women—with one exception, the priestess of Demeter Chamyne—were forbidden to be present, on pain of being thrown headlong from the Typæan Rock. The games were held at the first full moon of the summer solstice, when first throughout Elis, and then throughout the rest of Greece, heralds proclaimed the cessation of all intestine hostilities; while the territory of Elis itself was declared inviolable. The competitors were required to undergo a preparatory training for ten months in the gymnasium at Elis, and during the last of these months the gymnasium was almost as numerously attended as the games themselves. Much uncertainty prevails as to the manner in which the contests were distributed over the different days. Krause (*Olympia*, p. 106) suggests the following order: On the first day the great initiatory sacrifices were offered, after which the competitors were properly classed and arranged by the judges, and the contests of the trumpeters took place; the second day was set apart for the boys who competed with each other in foot-races, wrestling, boxing, the pentathlon, the pankration, horse-races; the third and principal day was devoted to the contests of men in foot-races of different kinds (as, for example, the simple race, once over the course; the *diaulos*, in which the competitors had to run the distance twice; and the *dolichos*, in which they had to run it seven or twelve times), wrestling, boxing, the *pankration* (in which all the powers and skill of the combatants were exhibited), and the race of *hoplites*, or men in heavy armour; on the fourth day came off the *pentathlon* (contest of five games—viz. leaping, running, throwing the discus, throwing the spear, and wrestling), the chariot and horse races, and perhaps the contests of the heralds; the fifth day was set apart for processions, sacrifices, and banquets to the victors (called *Olympionikoi*), who were crowned with a garland of wild olive-twigs cut from a sacred tree which grew in the Altis, and presented to the assembled people, each with a palm branch in his hand, while the heralds proclaimed his name, and that of his father and country. On his return home he was received with extraordinary distinction: songs were sung in his praise (14 of Pindar's extant lyrics are devoted to *Olympionikoi*); statues were erected to him, both in the Altis and in his native city; a place of honour was given him at all public spectacles; he was in general exempted from public taxes, and at Athens was boarded at the expense of the state in the Prytaneion. The regulation of the games belonged to the Eleans, from whom were chosen the *hellanodikai*, or judges, whose number varied. At first there were only two, but as the games became more and more national, and consequently more numerous, they were gradually increased to ten, sometimes even to twelve. They were instructed in their duties for ten months beforehand at Elis, and held their office only for one year. The officers who executed their commands were called *alytai*, and were under the presidency of an alytarch.

See Krause's *Olympia* (1838); Böttticher's *Olympia* (1882); Baumeister's *Denkmäler*; Lalon and Monceaux, *Restauration de l'Olympie* (1889); and Curtius and Adler, *Olympia die Ergebnisse der Ausgrabungen* (1891).

Olympia, capital of Washington state, on a peninsula at the south end of Puget's Sound, some 65 miles from the Pacific Ocean, and 121 miles by rail N. of Portland, Oregon. The Des Chutes River, which enters the sound here, provides abundant water-power, and the town has flour and saw mills, boot-factories, &c. Pop. 3500.

Olympiad, the name given to the period of four years that elapsed between two successive celebrations of the Olympic games, a mode of reckoning among the Greeks apparently first employed systematically by Alexandrian writers in the 3d century B.C. It is used only by writers, and is never found on coins and very seldom on inscriptions. The first recorded olympiad dates

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from the 21st or 22d of July 776 B.C., and is frequently referred to as the Olympiad of Corœbus; for historians, instead of referring to the olympiad by its number, frequently designate it by the name of the winner of the foot-race in the Olympic games belonging to that period. The first year of our present era (1 A.D.) corresponded to the last half of the fourth year of the 194th with the first half of the first year of the 195th olympiad. See CHRONOLOGY.

Olympias, the wife of Philip II., king of Macedonia, and mother of Alexander the Great. She was the daughter of Neoptolemus I., king of Epirus. She was a woman of great vigour and capacity, but was passionate, jealous, and ambitious. When Philip married Cleopatra, niece of Attalus, she left Macedonia, and she was believed to have instigated his assassination by Pausanias (337 B.C.). On the accession of Alexander she returned to Macedonia, and brought about the murder of Cleopatra and her daughter. Alexander treated her with respect, but he never allowed her to meddle with his political schemes. After his death she obtained the support of Polysperchon, and in 317 the pair defeated and put to death Philip Arrhidæus, the weak-minded step-brother and successor of Alexander, together with his wife Eurydice. Her cruelties soon alienated the minds of the people, whereupon Cassander besieged her in Pydna, and on its surrender put her to death, 316 B.C.

Olympiodorus, one of the latest of the Alexandrian Neoplatonists, flourished in the first half of the 6th century after Christ, during the reign of the Emperor Justinian. Regarding his life nothing is known. Of his writings we possess a *Life of Plato*, with commentaries or scholia on the *Gorgias*, *Philebus*, *Phædo*, and *Alcibiades I.* In these he appears as an acute and vigorous thinker and as a man of great erudition.—Another Olympiodorus, of the Peripatetic school, flourished in Alexandria in the 5th century B.C., and was the teacher of Proclus (q.v.).—A third Olympiodorus, from Thebes in Egypt, wrote in Greek a history of the western empire from 407 to 425 A.D., abridged by Photius.

Olympus, the ancient name of several mountains or chains of mountains—e.g. in Mysia, Cyprus, Lycia, Elis, Laconia, Arcadia, and one, the most famous of all, between Thessaly and Macedonia. Its eastern side, which fronts the sea, shows a line of vast precipices, cleft by ravines filled with forest trees. Oak, chestnut, beech, and plane trees are scattered along its base, and higher up grow forests of pine, as in the days of the old poets of Greece and Rome. Its highest peak is 9750 feet above the sea. It was regarded by the ancient Greeks as the chief abode of the gods, and the palace of Zeus was supposed to stand upon its broad summit. According to Greek legend it was formerly connected with Ossa, but was separated from it by an earthquake, allowing a passage for the Peneus through the narrow vale of Tempe to the sea. The philosophers afterwards transferred the abode of the gods to the planetary spheres.

Om is a Sanskrit word which, on account of the mystical notions that even at an early date of Hindu civilisation were connected with it, acquired much importance in the development of Hindu religion. Its original sense is that of emphatic or solemn affirmation or assent. Later it became the auspicious word with which the spiritual teacher had to begin, and the pupil had to end, each lesson of his reading of the Veda. And ultimately (as equal to *Aum*) it came to be regarded as an abbreviated method of naming the Hindu Trinity. In the Lamaist form of Buddhism the 'formula of six syllables,' *Om mani padme hum*, which is variously interpreted, is the most solemn and sacred of invocations; is the first thing taught to Tibetan and Mongolian children, the last prayer breathed by the dying man. It is found engraved on rocks, flags, and praying-wheels, and is looked on as the essence of religion and wisdom, and the means of attaining eternal bliss.

Omagh (Gael. *Oigh magh*, 'seat of the chiefs'), the county town of Tyrone, on the Strule, 34 miles S. of Londonderry and 110 NNW. of Dublin. It grew up around an abbey founded in 792, but is first heard of as a fortress in the end of the 15th century, when it was forced to surrender to the English. It formed part of James I.'s 'Plantation' grants, and was strongly garrisoned by Mountjoy. On its being evacuated by the troops of James II. in 1689 it was partially burned, and a second fire in 1743 completed its destruction. But it has been well rebuilt, and is now a neat and prosperous town. Pop. (1851) 3385; (1881) 4138.

O'maha, the chief city of Nebraska, is on the right bank of the Missouri, by rail 774 miles W. of Chicago and 501 NW. of St Louis. It is the terminus of four important railways, and the Missouri is spanned by a bridge (2750 feet, cost $1,250,000) to Council Bluffs, where a number of others start. The city is built on a plateau 80 feet above the river, and has wide streets, of which in 1889 there were 103 miles graded and 52 paved, while there were 73 miles of sewerage and 94 miles of street railways. A belt line of railway encircles the city. There are numerous large and costly buildings, including the city hall, United States court-house and post-office, Chamber of Commerce (1885) and Exposition (1886) buildings, Creighton College, and the high school; and in 1889 the city also contained a medical college, sixty public and private school buildings, and ninety-one churches. The manufactures include linseed-oil, boilers, safes, &c.; but above all Omaha possesses the largest silver-smelting works in the world, and the third largest pork-packing business in the United States (number of cattle slaughtered in 1889, 234,427; of hogs, 1,020,089; of sheep, 49,249). In 1889 the value of manufactured products was $23,515,000, exclusive of sales of wholesale dealers, $44,910,000; the clearing-house returns amounted to $208,681,000. There are eight daily and thirteen weekly newspapers published in English, German, Swedish, Danish, and Bohemian. Near the city are the headquarters of the military department of the Platte, embracing 82½ acres, and containing commodious barracks. Omaha was founded in 1854. Pop. (1860) 1912; (1870) 16,083; (1880) 30,518; (1890) 140,452.

Omahas, a tribe of American Indians, of the Dakota stock, settled in northern Nebraska, and numbering about 1200.

Oman, the most eastern portion of Arabia, a strip of maritime territory, extending between the Strait of Ormuz and Ras-el-Had, and bounded on the SW. by the deserts of the interior. At a distance of from 20 to 45 miles inland a chain of mountains runs parallel to the coast, reaching 6000 feet in Jebel Akhdar. There are some richly fertile tracts in this region, especially where water exists for irrigation. The coast is hot and not very healthy. This part of Arabia is under the rule of the sultan of Muscat (q.v.).

Omar. See CALIF.

Omar Khayyám, the astronomer-poet of Persia, was born at Nishapur, the capital of Khorassan, about the middle of the 11th century, and took his *takhallus* or poetical name, 'Khayyám,' from his father's calling of tent-maker. He

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was brought up under the great Sunni teacher, Imám Muaffik, and formed a close friendship with two of his fellow-pupils, Nizám-ul-Mulk and Hassan-ibn-Sabbah, of whom the one became vizier to the sultan Alp-Arslan, and the other founded the sect of the Assassins. Omar himself had an offer from his old friend of a place at court, but accepted instead a yearly pension of 1200 gold pieces. He, however, obeyed the summons of Malík Shah to Merv, and during his sultanate helped to reform the calendar. The result was the *Jaláli* era—'a computation of time,' says Gibbon, 'which surpasses the Julian, and approaches the accuracy of the Gregorian style.' To appease the *odium theologicum* that he had roused against himself he is said to have made the pilgrimage to Mecca; and he died in 1122 at Nishapur, where the north wind, as he predicted, still scatters roses on his tomb.

Of some mathematical treatises by him in Arabic, one on algebra has been edited and translated by Woepke (Paris, 1851); and it was almost solely as a mathematician that he was known to the western world, until in 1859 Edward FitzGerald (q.v.) published his 'translation' of seventy-five of his *Rubáiyát* or quatrains. The poet of Agnosticism, such was Omar Khayyám, though some in his poetry see nothing save the wine-cup and roses, and others read into it that Sufi mysticism with which, indeed, it was largely adulterated long after Omar's death. He was a true poet; yet his fate has been that of the man in the story who lost his shadow, to find it years afterwards grown to a great nobleman, through whom he perished. For FitzGerald's translation is so infinitely finer than the original that the value of the latter is such mainly as attaches to Chaucer's or Shakespeare's prototypes.

There are editions of the *Rubáiyát* by Nicolas (464 quatrains; Paris, 1867), Monbir Muhammad Sadik Ali (nearly 800 quatrains; Lucknow, 1878), and E. H. Whinfield (253 quatrains; Lond. 1883), who also translated them into very literal English verse (1882). A prose translation by Justin H. M'Carthy (1889) has little to recommend it. See an article by Professor E. Cowell in the *Calcutta Review* (January 1858), and vol. iii. of Fitzgerald's *Letters and Literary Remains* (1889).

Omar Pasha, Turkish general, was born at Plaski, in Croatia, in 1806 (according to some authorities, in 1811). His real name was Michael Lattas; he was educated for the Austrian army at the military school of Thurn, near Carlstadt. Having by a breach of discipline rendered himself liable to punishment, he fled to Bosnia, and, embracing Mohammedanism, gained through his beautiful caligraphy the post of writing-master to Abdul-Medjid, the heir to the Ottoman throne. On his pupil's accession in 1839 Omar Pasha was raised to the rank of colonel, and in 1842 appointed military governor of the Lebanon. In 1843 he displayed considerable skill and energy in suppressing an insurrection in Albania, and in the following years others in Bosnia and Kurdistan. On the invasion of the Danubian Principalities by the Russians in 1853 Omar Pasha collected an army of 60,000 men, and, crossing the Danube in presence of the enemy, intrenched himself at Kalafat, where he successfully withstood the Russians; after they withdrew from the Principalities Omar Pasha entered Bucharest in triumph in August 1854. On 9th February 1855 he embarked for the Crimea, and on the 17th of the same month repulsed with great loss 40,000 Russians who attacked him at Eupatoria. He was soon afterwards (October 3, 1855) sent to relieve Kars, but arrived too late. In September 1861 he was charged to pacify Bosnia and Herzegovina, which were again in insurrection. This being accomplished, he attacked the Montenegrins, captured Cetinje, and overran the country in 1862. He died 18th April 1871.

Ombre (through the Fr. from Span. *hombre*, 'man'), a game of cards borrowed from the Spaniards, and usually played by three persons, though sometimes by two and by five. The game is played with 40 cards (the eights, nines, and tens having been removed), and each player receives nine cards, three by three.

Omdurman. See SOUDAN.

O'Meara, BARRY EDWARD, physician to Napoleon on St Helena, was born in Ireland in 1786. He first served as surgeon in the army, but was dismissed the service in 1808 for a discreditable share in a duel at Messina. Later he entered the naval department, and was on board the *Bellerophon* when Napoleon surrendered to Captain Maitland. He pleased the great exile, and accompanied him as his private physician to St Helena. He took part with Napoleon in his squabbles with the governor, Sir Hudson Lowe, and was imprisoned and compelled to resign his post in 1818. On his return to England he asserted in a letter to the Admiralty that Sir Hudson Lowe had dark designs against his captive's life, and had attempted insidiously to corrupt himself. For this monstrous charge he was at once dismissed the service. His *Napoleon in Exile* (1822) made a great sensation, and is still valuable if read with caution. He died obscure in London, 3d June 1836.

Omelet (Fr. *Omelette*), an exquisite dish when exquisitely prepared, and like most good things perfectly simple. Break fresh eggs (not less than two or more than five) in a basin with a pinch of salt and pepper, beat for two seconds, pour into an omelet-pan in which butter (1 to 2 oz.) is boiling. Stir till the mixture sets, fry till *one* side is brown, double over in half and serve immediately. Savoury omelets are made by adding to the eggs finely-minced herbs, ham, bacon, fish, or game. For sweet omelets use a little sugar instead of pepper in the mixture, and place a spoonful of preserved fruit on the omelet before folding over. The word is said, by Littré and by Skeat, to be derived from the Old French *Alemelle* (a thin flat plate), first corrupted to *Amelette*, then *Omelette*.

Omen (perhaps originally *osmen*, for *ausmen*; root, *audio*, 'I hear'); also PRODIGY (Lat. *prodigium* for *prodicium*, from *prodico*), names given by the Romans to signs by which approaching good or bad fortune was supposed to be indicated. The former applied particularly to signs received by the ear and spoken words; the latter, to phenomena and occurrences, such as monstrous births, the appearance of snakes, the striking of the foot against a stone, the breaking of a shoetie, sneezing, and the like. It was supposed that evil indicated as approaching might be averted by various means, as by sacrifices, or by the utterance of certain magic formulas; or by an extempore felicity of interpretation, as when Cæsar, having fallen upon the ground on landing in Africa, exclaimed: 'I take possession of thee, Africa.' Occasionally we read of a reckless disregard of omens; as, for example, when P. Claudius in the first Punic war caused the sacred chickens, which refused to leave their cage, to be pitched into the sea, saying: 'If they won't eat, let them drink.' The belief in omens in one form or other has existed in all ages and countries, and traces of it linger in the folklore of all countries. And, indeed, there is no little philosophy in the Scotch proverb: 'Them that follow *freits*, *freits* follow.' See AUGURIES, DIVINATION, and FOLKLORE.

Omentum. See PERITONEUM.

Omichand. See CLIVE.

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Ommiades. See CALIF.

Omnibuses, vehicles 'for all,' the well-known public conveyances. So long since as 1662 Blaise Pascal, the author of the *Lettres Provinciales*, assisted by some noblemen, obtained a patent from the French king for the privilege of running public coaches, containing six persons, each along certain streets of Paris, and preserving its own route, for five sous per passenger. For two years the scheme proved a great success, but the death of Pascal and other causes occasioned its disuse. The first omnibus, built in Paris in 1820, was drawn by three horses, and soon became popular. Paris has also an excellent system of railway buses to contain eight passengers inside; the English railways have recently followed this practice. In England at the beginning of the 19th century stage-coaches were used by business men to reach London from its suburbs. These were succeeded by the omnibuses started in London, July 1829, by Mr Shillibeer, formerly a coachmaker in Paris, and were drawn by three horses, conveying twenty-two persons inside. Smaller and more convenient buses were introduced in 1849, which conveyed twelve passengers inside and two out. Outside seats along the centre of the roof followed in 1857, and the vehicle was subsequently much improved upon by Mr Miller of Hammersmith. Large omnibuses are in use in Glasgow and Manchester and other large towns, and the three-horse omnibus was re-introduced in London on the route from Charing Cross to Portland Road. Many recent improvements have been made in the arrangement of seats outside facing forward, the greater accommodation of the interior, and the lightness of the vehicle. The London General Omnibus Company, founded in 1855, took over 580 omnibuses. In 1891 it had 860 omnibuses, employing 9600 horses and 3000 men. Each bus runs about 12 miles daily. The company build for their own use about 90 or 100 buses annually. The average weight of an omnibus is 30 cwt., and the cost about £150. The more recent London Road Car Company, whose opposition to the older company has resulted in a great reduction of fares, runs 217 buses, and employs 2619 horses. The average charge per mile by bus is less than 1d.

Omnium, JACOB. See HIGGINS.

Omphacite (Gr. *omphaka*, 'unripe grape'), a grass-green granular variety of Pyroxene (q.v.), one of the constituents of Eclogite (q.v.).

Omphale. See HERCULES.

Omsk, chief town of the Russian province of Akmolinsk, stands at the confluence of the Om with the Irtish, 1800 miles E. of Moscow. It was built in 1716 as a defence against the Kirghiz; but is now of no importance as a fortress. It is the seat of administration for the Steppe provinces of western Asia. It has a military academy, a Greek and a Roman Catholic cathedral, a museum, governor's palace, &c., and a declining trade with the Kirghiz in cattle, hides, furs, and tea. Pop. (1887) 33,847.

On. See HELIOPOLIS.

Onager. See ASS, BALLISTA.

Onagraceæ, ONAGRARIÆ, or ŒNOTHERACEÆ, a natural order of exogenous plants, consisting chiefly of herbaceous plants, but including also a few shrubs; with simple leaves and axillary or terminal flowers. There are about 450 known species, natives chiefly of temperate climates, among which are some much cultivated for the beauty of their flowers, particularly those of the genera Fuchsia, Œnothera (Evening Primrose), Clarkia, and Godetia. The British genera are Epilobium (Willowherb) and Circæa (Enchanter's Nightshade). A few species produce edible berries, and the roots of one or two are eatable; but none are of economic importance. The root of *Isnarda alternifolia*, found in the marshes of Carolina, and called *Bowman's Root*, is emetic. Some species of Jussiæa are used in dyeing in Brazil.

One'ga, a seaport in the north of Russia, stands at the point where the river Onega empties into the White Sea, 87 miles SW. of Archangel. It is entered by about 120 vessels annually of a gross burden of 21,000 tons. Pop. 2547.

Onega, LAKE, in the north of Russia, after Ladoga, to the north-east of which it lies, the largest lake in Europe, is 50 miles in greatest breadth, 146 miles in length, and 1000 feet in depth in parts. Area, 3764 sq. m. It is fed by numerous rivers; but its only outlet is the river Swir, which flows south-west into Lake Ladoga. The northern end is studded with islands and deeply indented with bays. The shores in other parts are flat and low and regular. Although the water is ice-bound generally for 156 days in the year, the lake is the scene of busy traffic at other seasons. Communication is promoted by a canal cut parallel to the southern shore. Fish abound. Mirages are frequent at times. Surveys were completed in 1890 for a canal to connect Lake Onega with the White Sea; it will be 145 miles long, 10 feet deep, and 63 wide, and is expected to cost only £800,000, the greater part of the distance being along natural waterways.

Oneglia, a town on the Gulf of Genoa, 3 miles NE. of Porto Maurizio by rail. Pop. 7286.

Oneida. See PERFECTIONISTS.

Oneidas. See IROQUOIS.

O'Neil, HUGH. See TYRONE.

Onion (Fr. *oignon*, from Lat. *unio*, 'a pearl,' but in Columella signifying a kind of onion), the name given to a few species of the genus Allium (q.v.), and particularly to *A. cepa* (Lat. *cepa*), a biennial bulbous-rooted plant. The bulb is simple, and in the common variety is solitary, showing little tendency to produce lateral bulbs. The native country of the onion is shrouded in obscurity. It is supposed to be indigenous to India, whence it passed into Egypt, where it was cultivated 2000 years before the Christian era. Thence probably it was transmitted to Greece and Italy, and gradually spread over Europe, in most countries of which it has been cultivated from time immemorial. The onion contains a white acrid volatile oil, holding sulphur in solution, albumen, uncrystallisable sugar and mucilage, phosphoric acid, both free and combined with lime, acetic acid, citrate of lime, and lignin. The acrid qualities, while present in every part of the plant, are most concentrated in the bulb. When it is cultivated in warm countries the acridity decreases, while the saccharine qualities increase; hence the comparative mildness of Spanish and Portuguese onions. So mild and sweet are these that the peasantry of Spain and Portugal eat them raw with bread. Indeed, the onion forms a very important article of food with the poor of those countries. It is very nutritious and easily digested, yet does not agree with all stomachs when cooked otherwise than boiled. In boiling, the essential oil is dissipated and the onion thereby rendered more agreeable to delicate stomachs. The onion is stimulant, diuretic, expectorant, and rubefacient. The acid of the juice has the reputation of dissolving calculus in the bladder. The pulp of the bulb by fermentation is converted into vinegar, and with the addition of dregs of beer yields by distillation an alcoholic liquor. The pulp of roasted onion with olive-oil forms an excellent anodyne and emollient poultice to suppurating tumours. There are

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many varieties of the onion in cultivation in Britain, which have been obtained by natural seminal variation and by careful selection. In recent years great progress has been made by these means in the direction of increasing the size of the bulb, and there are now varieties which under good cultivation surpass even the large Spanish onion of the shops in size, but they lack the delicate flavour of the latter. There is great diversity in the keeping qualities of the bulbs of the different varieties. Those having small, compact bulbs keep best and for the longest time. By a proper selection of sorts home-grown onions may be had either green or matured all the year round. The Tripoli Trebon and White Lisbon are sown in August to supply green onions in spring; and if transplanted from the seed-bed to rich ground at that season they grow to very large size by September, when they reach maturity. James's Keeping, Strasburg, and Brown Globe are varieties which keep long and are sown in February and March for the main crop. The onion delights in rich, moist soil deeply trenched; when very large bulbs are desired it is hardly possible to overdo the ground with manure. When the crop ripens, which is known by the central leaves ceasing to grow and the lower ones going to decay, the bulbs are taken up and spread out thinly on a dry surface in the open air till they are quite dry; they are then stored in a loft where, in mild weather, they may have plenty of air but be protected from frost and damp.—The Potato-onion, so called because it reproduces itself underground by division of the bulb, is a perennial variety of the onion which also bears the names Egyptian and Ground Onion. It is much favoured by cottagers, in Scotland particularly. A legend that it was first brought to Britain by the British army from Egypt in 1805 is without foundation, as it was cultivated long before that time in the country. Pickling onions are usually obtained by sowing the small silver-skinned variety on poor soil in spring. The Tree-onion, so named because, instead of producing seeds after flowering, the ovaries develop viviparous bulbs by which the plant is propagated, is rarely cultivated except as a curiosity. The Welsh Onion, or Cibol (*A. fistulosum*), produces no bulb, but merely a fleshy stem like the leek. It is a native of Siberia, and being very hardy was formerly grown in gardens to supply green onion tops in spring for salads and the flavouring of soups and sauces. Being rather coarse in flavour, however, it has been superseded by the milder flavoured kinds, which are sown in August. It is the true *syboe* of the Scotch, although the term has come to be applied to green or young onions of whatsoever kind.

Onkelos, the reputed author of an Aramaic Targum of the Pentateuch. See TARGUM.

Onomacritus, a religious poet of ancient Greece, lived at Athens in the time of the Pisistratidæ. He exercised great influence on the development of the Orphic mysteries, and collected the prophecies or oracles of Musæus (q.v.), but was banished by Hipparchus for falsifying them. He followed the Pisistratidæ into Persia, and was by them induced to repeat to Xerxes all the ancient sayings that seemed to favour his invasion of Greece. He helped to arrange the Homeric poems, and is suspected of having introduced interpolations into the text of them.

Onomatopœia, a term used in philology to denote the formation of words in imitation of natural sounds, as in *cuckoo*, *pee-wit*, and the like. See PHILOLOGY.

Onondagas. See IROQUOIS.

Ontario, the easternmost and smallest (7240 sq. m.) of the five great lakes of North America, receives at its south-west corner the waters of the upper lakes by the Niagara River, and at its north-east corner it issues into the St Lawrence. Its surface, which is subject to periodical variations (4 to 7 years) of about 3½ feet, and which it is attempted to explain on the supposition of there being a subterranean river out of the lake, is $326\frac{5}{10}$ feet below the surface of Lake Erie and $246\frac{8}{10}$ feet above the ocean-level. Its mean depth is about 300, its maximum depth 738 feet. It is 190 miles long, 55 in its widest part, and over 500 in circumference. It has many thriving ports, of which the chief are Kingston, Coburg, Port Hope, Toronto, and Hamilton on the Canadian shore, and Sackett's Harbor, Oswego, and Charlotte in the United States. It is connected with Lake Erie by the Welland Canal, with the Erie Canal and river Hudson by the Oswego Canal, and by the Rideau Canal with the Ottawa; and in 1890 a ship-railway (69 miles) was projected, to connect this lake with Lake Huron. Lake Ontario is subject to violent storms, and it is probably owing chiefly to the constant agitation of its waters that it freezes only for a few miles from the shore. The shores are generally very flat, but the Bay of Quinte, near Kingston, a long, crooked arm of the lake, which stretches about 50 miles, possesses some attractive scenery. Burlington Bay, on which Hamilton lies, is a large basin almost enclosed by a natural bank of sand, which forms a beautiful drive. See Crosman's *Chart* (1888).

Ontario, the most populous and wealthy province of the Dominion of Canada, is bounded NE. and E. by Labrador and Quebec, SE., S., and SW. by the St Lawrence and the Great Lakes, N. by St James' Bay, and NW. and W. by Keewatin and Manitoba. Area, 181,800 sq. m.; pop. (1881) 1,923,228; (1891) 2,112,989. The province extends from about 74° 50′ to 95° W. long. The surface is generally undulating, and there are no elevations of any considerable height. The Laurentian Hills run westward from the Thousand Islands near Kingston, and extend north of Lake Simcoe, forming the coasts of Georgian Bay and Lake Huron. In the middle of the province the high land forms a watershed, separating the rivers flowing into the Great Lakes from those entering the Ottawa and the St Lawrence. The principal rivers of Ontario are tributaries of the Ottawa, which forms part of its north-eastern boundary. The St Lawrence forms the boundary of the eastern portion of the province, dividing it from the United States. Bounded by the Great Lakes, among its smaller lakes are Simcoe, Nipissing, Nipigon, and many others. Ontario is largely an agricultural country, and its resources are very great. Immense crops are raised of all the products of a temperate climate, and in the south-west corner of the province Indian corn is a regular crop, and grapes, peaches, and tomatoes are grown and ripen in the open air. In addition to arable farming, stock-raising, dairy-farming, and fruit-growing are important industries. In minerals the country is also rich. Iron is found in many parts; copper, lead, plumbago, apatite, antimony, arsenic, gypsum, marble, and building-stone are abundant; there are also gold and silver deposits—the latter very extensive in the country along the shores of Lake Superior and west to the Lake of the Woods. The nickel deposits at Sudbury are probably the most extensive in the world. The petroleum-wells, in the south-west part of the province, are yielding immense and apparently inexhaustible supplies; the same may be said of the salt-wells on the shores of Lake Huron. Largely owing to the favourable position which the province occupies with regard to water-power—although steam-power is established to a large extent, coal being obtained

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without difficulty by means of the lakes, from Pennsylvania, and also from Nova Scotia—the manufactures are numerous and abundant.

The principal manufactures are agricultural implements, iron and woodware, wagons and carriages, railway rolling-stock (including locomotives), cottons and woollens, leather, furniture, flax, ordinary iron and hardware, paper, soap, woodenware, &c. The most thickly populated part of Ontario more nearly resembles England than any of the other colonies. There is only one large city, Toronto, which contains nearly 200,000 inhabitants; but smaller cities and towns, such as Ottawa (44,000 inhabitants), Hamilton (43,000), London (27,000), Kingston (17,000), Guelph (11,000), St Catherine's (11,000), Brantford (13,000), St Thomas, Peterborough, Port Hope, Woodstock, Galt, Lindsay, Paris, and Port Arthur, are scattered all over the province, and are usually manufacturing or agricultural centres. The farms in these districts are well cultivated and fenced, with houses as a rule superior to those found in Great Britain. Ontario has a perfect network of railways (between 5000 and 6000 miles), which has proved of great advantage in the development of the manufacturing and agricultural industries; and in summer it is supplemented by the means of transport provided by the lakes and by the magnificent system of canals on the St Lawrence. The revenue of Ontario is about $5,000,000, made up of subsidies and contributions from the Dominion treasury, land and lumber sales, licenses, stamps, &c. The expenditure is invariably under the revenue, and the finances of the province are in a thoroughly satisfactory condition.

The value of the imports in 1889 was $42,292,819, including $24,912,245 from the United States and $14,542,782 from Great Britain. The value of the exports in the same year was $30,336,698, of which $23,449,821 went to the United States and $3,728,174 to Great Britain. The exports of the produce of the province may be divided into the following heads: Minerals, $333,352; lumber, $397,885; animals and their produce, $6,762,397; agricultural products, $8,628,195; manufactures, $2,012,977; and miscellaneous, $475,680.

The school system of Ontario is admirable, and is under the control of a minister of Education, who is always a member of the Provincial Cabinet. The schools are supported by a tax on property, with state grants, and are free to all. Roman Catholics may, if they think proper, establish separate schools, and are then exempted from supporting the public schools, receiving a separate grant from government. The children attending the schools in 1887 were 493,212, out of a total school population of 611,212. There are many universities and colleges, and the facilities for higher education are quite equal to those provided for elementary purposes. The municipal system is one of the most perfect in the world, and affords a pattern which has been followed in many other countries. The public affairs are administered by a lieutenant-governor, an executive council of five members, and a legislative assembly of 90 members elected every four years. In the Dominion parliament the province is represented by 24 members in the Senate and 92 members in the House of Commons. In Ontario the Protestant religious bodies predominate; the Methodists are the most numerous, followed by the Presbyterians, then by the Church of England.

History.—Ontario was largely founded by the immigration of United Empire loyalists into Canada after the declaration of independence of the United States. It was made into a separate province and called Upper Canada in 1791 (see article CANADA). The two provinces were reunited in 1840, as the result of the disturbances in 1837 and 1838, and remained in that position until confederation in the year 1867, when the province received the name of Ontario.

Ontology. See METAPHYSICS, PHILOSOPHY.

Onus Probandi, i.e. the burden of proof, is often a difficult question in litigation; but as a rule the plaintiff who institutes the suit is bound to give proof of the allegations on which he relies.

Onyx, an agate formed of alternating white and black, or white and dark-brown stripes of chalcedony. More rarely a third colour of stripes occurs. The finest specimens are brought from India. Onyx is in much esteem for ornamental purposes. The ancients valued it very highly, and used it much for cameos. Many of the finest cameos in existence are of onyx. The name onyx, however, appears to have been applied by the ancients more extensively than it now is, and even to striped calcareous alabaster, such as is now called Onyx Marble. The *Sardonyx* of the ancients is a variety of onyx in which white stripes alternate with stripes of a dark-red variety of carnelian, called *sard* or *sarda*. It is one of the rarest and most beautiful kinds of onyx, and is more valued than carnelian.

Oodeypore. See UDAIPUR.

Oojein. See UJJAIN.

Ookiep. See CAPE COLONY, Vol. II. p. 735.

Oolachan. See CANDLE-FISH.

Oolite (Gr., 'egg-stone'), a variety of limestone, composed of spherical granules of calcic carbonate, which have a concentric and often a fibrous radiating structure. In many cases these granules contain a nucleus or kernel of some foreign substance, such as a grain of sand, round which the successive layers or encrusting coats of calcic carbonate have been formed. Granules of this nature are seen forming in the springs of Carlsbad. A similar oolitic structure has been observed occasionally in the coral-rock forming the surface of modern coral-reefs—which seems to owe its origin to the movement to and fro of grains of coral sand in pools or sheltered places in which the water is highly saturated with carbonate of lime, derived from the decomposition of dead coral. The coarser varieties of oolite are termed *Peastone* or *Pisolite*.—For Oolite as the name for a group of strata, see JURASSIC SYSTEM.

Oonalashka. See ALEUTIAN ISLANDS.

Oori, LIMPOPO, or CROCODILE RIVER, a river of south-eastern Africa, has its sources in the heart of the Transvaal, between Pretoria and Potchefstrom, describes a huge curve to the north, and joins the Indian Ocean a little north of Delagoa Bay. Its course exceeds 800 miles, and it has numerous tributaries, the most important being the Olifant from the right. The Limpopo has been ascended 50 miles by steamboat; but its upper reaches are obstructed by rapids and falls.

Oosterhout, a Dutch town in North Brabant, 6 miles NE. of Breda, with sugar-factories, tanyards, breweries, potteries. Pop. 10,911.

Oosterzee, JAN JAKOB VAN, theologian, was born in 1817 at Rotterdam, studied at Utrecht, was a pastor in Rotterdam, and in 1862 became a theological professor at Utrecht, being the leader of the Evangelical school in Holland. He died 29th July 1882. He wrote many works, amongst them a Life of Christ, a Christology, a work on John's Gospel (in German), commentaries on Luke and the Pastoral Epistles in Lange's Commentary; also a *Theology of the New Testament* (1867; Eng. trans. 1870, 4th ed. 1882); *Christian Dogmatics* (1872; trans. 1874); *Moses* (trans. 1876); *Practical Theology* (trans. 1878).

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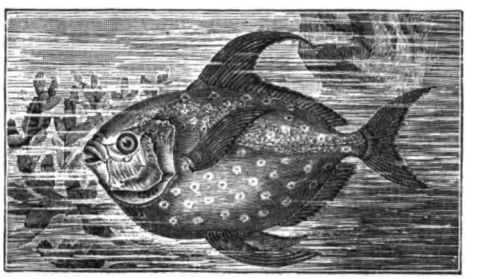
Ootacamund, or UTAKAMAND, the chief town in the Neilgherry (q.v.) Hills, the principal sanatorium of the Madras Presidency, and the summer headquarters of the governor of Madras. It stands on a plateau, in an amphitheatre surrounded by hills, 7228 feet above the sea, 350 miles from Madras city, and 24 from the nearest railway station on the Madras line. There are a public library (1859), the Lawrence Asylum (1858) for the children of British soldiers, and botanical gardens. The mean annual temperature is 58° F. The first house was built in 1821. Pop. 12,335.

Ooze, a term technically applied to some kinds of deposits found covering the bottom of the deeper parts of the sea. It is not only the depth of the water, but the distance from the land which determines the occurrence of ooze. As we pass from the shore out to sea we find a succession of deposits, shingle, sandy mud, mud—all derived from the land; but at a distance varying from 60 to 300 nautical miles from the shore, and at a depth of 2000 feet or more, lie the various oozes, which consist of the remains of numerous small organisms, but especially of the shells of Foraminifera. A whitish deposit, containing enormous numbers of Globigerina shells, which in dying have sunk from the surface, is very widely distributed till depths of about 2000 fathoms are approached. There the Globigerina ooze wanes away, and is replaced in the deeper regions by so-called 'red clay.' At the surface above there are of course here as elsewhere abundant Foraminifera which still doubtless sink, but the physical conditions of the great depths are such that their shells are dissolved in falling. But in certain of the deepest parts—e.g. at 4575 fathoms—the *Challenger* explorers found another kind of ooze, composed of the flint shells of Radiolarians. Besides this, in other regions the shells of Pteropods and Diatoms are abundant enough to form a characteristic ooze.

It is to be understood, however, that the various oozes (Globigerina, Radiolarian, Pteropod, Diatom, &c.) pass into one another, and that the names usually express simply the predominance of one or other kind of shell, and also that the colours—white, yellow, brown, and red—mainly denote the proportion in which the 'red clay' is present. The latter owes its colour to the oxides of iron and manganese, and is composed of disintegrated materials of volcanic origin, such as pumice, and also of meteoric dust. These, after being carried by winds and floated on ocean currents, sink and are distributed at the bottom. But as to the ooze in the strict sense, it ought also to be noted that the dead or dying organic material, which the rain of these organisms brings to the bottom, serves as the fundamental food-supply of deep-sea animals, while the shells not only accumulate as ooze, but aid in the elevation of submarine volcano tops to the level at which corals can grow. Finally, the results of the ooze of incalculably distant ages are seen in the chalk cliffs often obviously composed of Foraminifera, or in such Radiolarian deposits as Barbadoes Earth. See CHALK, DIATOM, FORAMINIFERA, GLOBIGERINA, PTEROPOD, RADIOLARIAN, SEA, and the concluding volume of the *Challenger* Reports by Murray and Renard.

Opacite, name given by petrologists to minute black, opaque, amorphous aggregates, grains, and patches of indeterminate mineral matter, which are seen in many igneous rocks when these are viewed in thin slices under the microscope. Opacite is probably in most cases hematite, limonite, magnetite, or other iron oxide, and is a product of the chemical alteration of one or other of the original mineral constituents of the rock in which it occurs.

Opah, or KING-FISH (*Lampris luna*), a fish of the family Coryphænidæ or 'Dolphins,' order Acanthopterygii. The body is compressed laterally and deep, and is covered with small deciduous scales. The cleft of the mouth is narrow, and there are no teeth. The dorsal fin is single and has no spinous portion; the pectoral and ventral fins are falciform and of nearly equal length. The tail is forked. The lateral line has a strong curve behind the head, and becomes straight about midway between the eye and the root of the tail. This fish is beautifully coloured; the back is bluish green; the sides violet, becoming red underneath; round or oval silvery spots are scattered all over the body; the fins and tail are deep scarlet. It is found only occasionally near shore. It prefers the deeper waters of the North Sea, being found off



Opah (*Lampris luna*).

Norway, the British Isles, Iceland, Newfoundland, and especially near the Azores and Madeira. It is rare in the Mediterranean, and has not been recorded off Greenland or east of the North Cape in Norway. Specimens have been caught measuring 6 feet in length; one of 4 feet 5 inches weighed 140 lb. The flesh is red or yellowish in colour, and is excellent to eat. Its food, so far as is known, consists of cuttle-fish and other cephalopods. Other names applied to it are Sun-fish (a name also applied to Orthagoriscus and to the basking shark), because it comes to the surface of the water in calm weather, Sea-pert, Carf, and Jerusalem Haddock.

Opal, a mineral which differs from quartz in containing generally 3 to 10—in some cases only 1, in others as much as 21—per cent. of water, its only other essential constituent being silica, although a little alumina, oxide of iron, &c. is often present. The water is readily driven off on the application of heat, and some opals contain so small a proportion of water that they might be described simply as jelliform quartz. Not infrequently minute scales or plates of tridymite (a crystallised variety of silica) are present in opal. The latter is never found crystallised, and does not exhibit a crystalline structure like quartz. It has a conchoidal fracture, and is very easily broken. There are many varieties, which pass into one another, so that their precise limits cannot be defined, from which has arisen no little confusion of names. The finest kind is called *Precious Opal* or *Noble Opal*, and sometimes *Oriental Opal*. It is semi-transparent or translucent, usually of a bluish or yellowish white colour, yellow by transmitted light, and exhibits a beautiful play of brilliant colours, owing to minute fissures which refract the light. It is much valued for setting in rings, brooches, &c., and is polished with a convex surface, never cut into facets, both because of its brittleness and because its play of colours is thus best exhibited. The ancients valued opals very highly. The Roman senator Nonius preferred exile to giving up an opal to Mark Antony. This opal was still to be seen in the days of Pliny, who ascribes to it a value equal to more than £100,000 sterling. The

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imperial cabinet of Vienna contains the most celebrated opal now known to exist. It is 5 inches by 2½ inches. The finest opals are almost all brought from Cerwenitza, between Eperies and Kaschau, in Hungary, where they are found disseminated as alteration-products in trachyte tuff. They are mostly very small, but even a very small opal, if really beautiful, is worth four or five pounds; and the price increases very rapidly with increase of size. Precious opal is found also in Saxony, in South America, &c. When the colours are not equally diffused, but in detached spots, jewellers call it *Harlequin Opal*. There is a dark or blackish variety, apparently tinged by oxide of iron, which occasionally exhibits very beautiful reflections, and is then much prized. *Girasol* (q.v.) and *Cacholong* (q.v.) are varieties of opal. What lapidaries call *Prime d'Opal* is porphyrite or other igneous rock, containing many small amygdules of opal. It is cut into slabs, and made into boxes and other ornamental articles; the stone which contains the opals being often artificially blackened by boiling in oil, and afterwards exposing to a moderate heat. —*Common Opal* is semi-transparent, white, yellow, green, red, or brown, and does not exhibit any play of colours. It is not a rare mineral, and is chiefly found in veins and cavities or diffused (as an alteration-product) through the mass of various igneous rocks. *Semi-opal* is more opaque. *Wood Opal* is a petrifaction, and exhibits the form and structure of wood, the place of which has been taken by the siliceous mineral. *Hyalite* and *Menilite* are varieties of opal.

Opera (Ital. *Opera in Musica, Dramma per la Musica*) is a drama which is sung throughout to the accompaniment of a full orchestra. The various forms of aria or song, recitative or declamation, duet, trio, &c., concerted piece or instrumental interlude are used as the exigencies of the situation demand. The whole is usually introduced by an introduction, *vorspiel*, or Overture (q.v.), and often one of the acts contains a ballet or pantomimic dance. It is a direct development from the discovery by the Florence Academy (see MUSIC) of Monody or the musical expression of a single individuality by a single voice. As every country, every school since 1600 has felt the fascination of the art problem, and nearly every great composer has been ambitious to solve it, the opera is a universal possession, and its range is almost as wide and varied as the history of music itself. Three schools may be distinguished. *Italian Opera* is marked by its spontaneity and melodious character, and even more by the honour of priority; *German Opera* is the product of greater geniuses than the other two schools can boast, but lacks the continuity which makes the *French* school so interesting to the student.

Italian School.—The experiments in scena-writing (1582–90) culminated at Florence in the first real opera, *Dafne* (1594), by Peri and Caccini, the more successful *Euridice* (1600), and the very advanced work of Monteverde. The new departure in music soon spread its influence beyond Florence to Venice, where Monteverde spent the last thirty years of his life, and to Naples, where Alessandro Scarlatti (1659–1725) took up the work and founded the Neapolitan or 'beautiful' school. Scarlatti, by the prominence he gave to melody, may be said to be the founder of Italian opera, which to this day is noted for so-called melody in profusion, and the comparative indifference to other as important qualities, such as harmony, orchestration, and dramatic unity. No Italian work of the 18th century has survived save Cimarosa's *Il Matrimonio Segreto* (1792), which, very similar in style to Mozart's greater works, has been overshadowed by these. The most famous modern Italian composer is Rossini, a brilliant vocal writer, whose charming *Barber of Seville* (1816) is a model of *opera buffa*, and whose serious opera, *William Tell* (1829), also keeps a place in the repertoire of the European stage. Bellini's *Norma*, *La Sonnambula*, *Puritani*, and Donizetti's *Lucia di Lammermoor* and *Lucrezia Borgia* still survive out of more than 100 melodious works. The earlier operas of Verdi are quite Italian in style (*Trovatore*, 1851; *Traviata*, 1853, &c.). *Aida* (1871) shows a leaning to, and *Otello* (1887) complete adhesion to the modern music drama. The veteran composer at the age of eighty-eight produced still another work, *Falstaff* (1891).

German Opera.—During the 17th and early part of the 18th century the opera in southern Germany was purely Italian. Dresden, where Hasse reigned supreme, and Vienna were the two centres. It was in Hamburg that the National school was founded by Keyser, who wrote (1694–1734) over 100 operas in which a high dramatic ideal is apparent. Gluck, though a German, belongs more to the school of French Grand Opera. Mozart, after beating the Italians on their own melodic ground in *Idomeneo*, *Die Entführung*, *Figaro*, and *Don Giovanni* (1781–87), wrote the first national romantic opera, *The Magic Flute* (1791). Beethoven, desiring nobler plots of a more serious and moral character than had satisfied the light-hearted Mozart, chose Bouilly's *Léonore* as the foundation of his single opera *Fidelio* (produced 1805, rewritten 1814). The operas of Weber were deeply imbued with the romanticism of the early 19th century, and in *Der Freischütz* (1821) he uses the national folklore with immense effect. To this new Romantic school also belong the operas of Marschner and of Spohr, the beauty of whose music is buried, like Weber's *Euryanthe* and Schubert's *Rosamunde*, under absurd libretti.

Melodrama in opera is an effective device which originated in Germany. The singer recites his part in an ordinary speaking voice accompanied by orchestral music, which seeks to convey the meaning of the situation and scene to the audience. Benda first used it (*Ariadne*, 1774), and Mozart, who heard it in 1778, was much impressed by its possibilities. The most successful example is the grave-digging scene in Beethoven's *Fidelio;* Weber in *Der Freischütz* and Mendelssohn in *A Midsummer Night's Dream* have also used it with happy effect.

The *French Grand Opera School* is extremely important, not only on account of its continuity and consistence, but because at various times, and for various reasons, great men were attracted from foreign countries to it as a centre. It was founded by the Florentine Lully, reformed by the German Gluck; and Italians like Cherubini, Spontini, Rossini, Belgians like Grétry, Germans like Meyerbeer and Wagner have both learned from it and contributed to its various stages of development. Lully (born 1633) arrived in Paris a boy of thirteen in the train of the Chevalier de Guise, and by his diplomatic and social, no less than by his musical talents, he gradually pushed his way to the very summit of musical success, and lived in great favour with King Louis XIV. In 1672 he obtained a patent conferring the sole right of producing operas in Paris, and this monopoly he held till his death in 1687. Musical Paris was sharply divided between his followers and those of Rameau (1683–1764), until the arrival of an Italian company made them unite their ranks in opposition to the foreigners. The characteristic of this French school from its beginning was its attention to rhetoric and dramatic requirements. The treatment of recitative in particular has always been a feature since Lully's time, and he it was also who invented the overture. Gluck arrived in Paris in

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1774, and produced his *Iphigénie en Aulide* and *Iphigénie en Tauride* there; and the ideal expressed by Peri and Monteverde, embodied to a considerable extent in these and other works (see GLUCK), has at last found its goal in the music drama of Wagner. Cherubini's seriousness and nobility of style (*Les Deux Journées*, 1800), Méhul's fine ear for effect (*Joseph*, 1807), Spontini's magnificence of conception (*Vestale*, 1805), and Halévy's dramatic truth (*Juive*, 1835) were all ranged under Gluck's banner, and the roll of French grand opera is brought to a gorgeous close with the name of Wagner's predecessor, Meyerbeer (*Robert le Diable*, 1831, *Huguenots*, 1836, *Le Prophète*, 1843). The new blood he brought with him from the schools of Germany and Italy invigorated it, and the time was ripe when the experiment of *Rienzi* was made in 1842. Other important contributions to grand opera were Auber's *Masaniello* (or *Muette de Portici*, 1828) and Rossini's *Guillaume Tell* (1829).

Opéra Comique (by no means *comic* opera) is a title applied to all works which, on account of *spoken dialogue*, were not eligible for performance at the Grand Opéra. Grétry's *Cœur de Lion* (1784), Méhul's *Joseph*, Boieldieu's *La Dame Blanche* (1825), Hérold's *Pré aux Clercs* (1832), and Auber's *Le Maçon*, *Les Diamants de la Couronne*, &c. are the most famous. This *Opéra Comique*, so purely French, had a large share in the development of the modern lyric opera, of which Gounod's *Faust* (1859), Thomas's *Mignon* (1871), and Bizet's *Carmen* (1875) are good examples.

The *Ballet* (entirely pantomimic) attained a very high pitch of development in Paris, where Delibes (1836–91) produced his charming *Coppélia* and *Sylvia*.

Comic opera proper (*Opera Buffa*) is represented in Italy by Rossini's *Barbiere* and Donizetti's *Figlia del Reggimento* (1840); in Germany by Flotow's *Martha* (1847), Nicolai's *Merry Wives* (1849), and Lortzing's *Czar und Zimmerman* (1854); in France (*Opéra Bouffe*) by Offenbach's *Orphée aux Enfers* (1858), *Grande Duchesse* (1867), &c., Lecocq's *Madame Angot* (1873), &c., and numberless other bright works; and in England worthily by the charming Gilbert-Sullivan series (*Pinafore*, 1878; *Patience*, 1881; *Mikado*, 1885).

Music Drama is the ideal which Wagner has sought to embody in *Tristan und Isolde* (1865), *Meistersinger* (1868), *Ring des Nibelungen* (1876), and *Parsifal* (1882). *Rienzi* (produced in Dresden in 1842) establishes his connection with the Grand Opera of Meyerbeer, and in the *Flying Dutchman* (1843), *Tannhäuser* (1845), and *Lohengrin* (1849) the growth of his method is distinctly seen, as well as his indebtedness to many predecessors, especially, in orchestration, to Berlioz. Wagner seeks to make the 'Art Work of the Future,' as he calls it, equally dependent on music, drama, and scenic art—the requirements of none being sacrificed to the demands of the other, but all contributing to one perfect unity. His influence is clearly traceable in all modern operas—e.g. Goldmark's *Queen of Sheba*, *Merlin*, Boito's *Mefistofele*, Ponchielli's *Gioconda*, Verdi's *Otello*, &c.

English Opera.—Purcell's early work, *Dido and Æneas*, written at the age of seventeen, his chef d'œuvre *King Arthur* (1691), and other works gave promise of such an English school of opera as the 'Masques' of Lawes and others had suggested (1613–75), but no one was ready to carry on the work after his early death in 1695 (aged thirty-seven). Dr Arne's *Artaxerxes* (1762), out of thirty-four operas, is the only other English opera which calls for mention. Italian opera became the fashion in London (Handel wrote forty-four, 1710–39), and England's attention has been divided between that school and the highly inæsthetic and, from an operatic point of view, worthless form of *Ballad Opera*, founded by Dr Pepusch (*Beggar's Opera*, 1728), until recent years, when Dr Mackenzie's *Colomba* (1883), Villiers Stanford's *Canterbury Pilgrims* (1884), Goring Thomas's *Esmeralda* (1883) and *Nadeschda* (1885), and lastly Sullivan's *Ivanhoe* (1891) have sought to win recognition for England among the European schools of opera.—English opera was introduced into America in 1750, in the shape of the *Beggar's Opera*, and Italian opera in 1825.

See Hogarth, *Memoirs of the Opera* (1851); H. Sutherland Edwards, *Essays on Modern Opera* (1881); D. Hanslick, *Die Moderne Oper*, in three parts (1885); the articles in Grove's and other musical dictionaries on Opera, &c., and on GLUCK, MOZART, WEBER, WAGNER, &c. in this work.

Opera-glass (Fr. *lorgnette*), a double telescope, used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers at a theatre or opera, &c. The opera-glass is short and light, and can be easily managed with one hand. Its small magnifying power (from two to three at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasant picture, so that the eye is not strained to make out details, as in telescopes of greater power, which generally show a highly-magnified but faint picture. It allows the use of both eyes, which gives to the spectator the double advantage, not possessed by single telescopes, of not requiring to keep one eye shut (a somewhat unnatural way of looking), and of seeing things stand out stereoscopically as in ordinary vision.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object-lens and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another (see TELESCOPE). The opera-glass need not be set to a precise point, as is necessary with ordinary terrestrial telescopes, for the lengthening or shortening of the instrument does not produce so decided an effect on the divergence of the light; the change of divergence caused by screwing the opera-glass out or in is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular length at which an object at a certain distance is most easily looked at. The two telescopes of the opera-glass are identical in construction, and are placed parallel to each other. The blending of the two images is easily effected by the eyes, as in ordinary vision. Opera-glasses have now come into such demand that they form an important article of manufacture, of which Paris is the great seat. So largely and cheaply are they produced in Paris that it has nearly a monopoly of the trade. They may be had from 2s. 6d. to £6 or £7. The cheapest opera-glasses consist of single lenses; those of the better class have compound achromatic lenses. A very ordinary construction for a medium price is to have an achromatic object-glass, consisting of two lenses, and a single eye-lens. In the finest class of opera-glasses, which are called *field-glasses*, both eye-lenses and object-lenses are achromatic. Plössl's celebrated field-glasses (Ger. *Feldstecher*) have twelve lenses, each object-lens and eye-lens being composed of three separate lenses.

Ophicleide (Gr. *ophis*, 'serpent,' and *kleis*, 'key'), a brass bass wind-instrument, was developed from improvements on the Serpent (q.v.) about the beginning of the 19th century. It consists of a conical tube having a bell like that of

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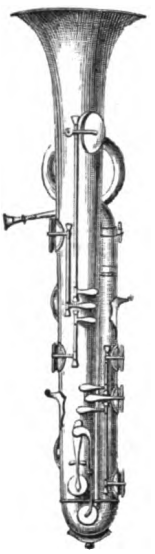
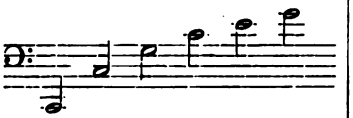
the horn, a cup mouthpiece, and usually eleven holes stopped by keys like the old Kent bugle. It has the usual harmonic (see HARMONICS) open notes of all brass instruments, its fundamental, never used, being an octave lower. By means of its keys it has a range, including all the semitones, of a little over three octaves, and its music is written in the



Ophicleide.



bass clef. Alto and double-bass ophicleides have also been made, but not much used. It is much to be regretted that an instrument of such a characteristically rich tone, and capable of intonation so accurate as the ophicleide, should be allowed to fall completely out of use, it being almost superseded by the simpler three-valved instruments of the Saxhorn (q.v.) type.

Ophidia. See SERPENT.

Ophioglosseæ, a sub-order of Filices or Ferns (q.v.), consisting of a few rather elegant little plants with an erect or pendulous stem, which has a cavity instead of pith, leaves with netted veins, and the spore-cases (*thecæ*) collected into a spike formed at the edges of an altered leaf, 2-valved, and without any trace of an elastic ring. They are found in warm and temperate countries, but abound most of all in the islands of tropical Asia. Several species are European, and two are British, the *Botrychium lunaria*, or Moonwort (q.v.), and the Common Adder's-tongue (*Ophioglossum vulgatum*), which was at one time supposed to possess magical virtues, and was also used as a vulnerary, although it seems to possess only a mucilaginous quality—on account of which some of the other species have been employed in broths. It is a very common plant in England, its abundance in some places much injuring pastures.

Adder's-tongue (*Ophioglossum vulgatum*).

Ophir, a region, frequently mentioned in the Old Testament, from which the ships of Solomon, fitted out in the harbours of Edom, brought gold, precious stones, sandalwood, &c. The voyage occupied three years. Where Ophir was situated has been a much-disputed question. Arias Montanus fixed on Peru, Raleigh on the Moluccas, and Calmet on Armenia. Probably, however, Ophir was either on the east coast of Africa about Sofala, or in Arabia, or in India, but in which of the three countries is doubtful. Milton (following Purchas), Huet, Bruce ('the Abyssinian'), the historian Robertson, Quatremère, Mauch, &c. are in favour of Africa; Michaelis, Niebuhr (the traveller), Gosellin, Vincent, Winer, Fürst, Knobel, Forster, Crawfurd, Kalisch, and Twistleton (Smith's *Dict. of the Bible*), of Arabia; Vitringa, Lassen, Ritter, Bertheau, Ewald, and Max-Müller, of India. Josephus, however, it should be said, placed Ophir in the peninsula of Malacca, and his opinion has been adopted by Tennent and Von Baer. For a complete discussion of the point, see Ritter's *Erdkunde* (vol. xiv.), eighty pages of which are devoted to Ophir. According to Ritter, who accepts Lassen's view, Ophir was situated at the mouth of the Indus.

Ophites (Gr. *ophitai*, from *ophis*, 'a serpent'), a class of Gnostics, who, while they shared the general belief in dualism, the conflict of matter and spirit, the emanations, and the Demiurgos, were distinguished by giving a prominent place in their systems to the serpent. Some of their divisions were the Sethiani, the Naaseni (Heb. *nahash*, 'serpent') in Phrygia, and the Peratæ, who honoured the serpent which tempted Eve, as having introduced knowledge and revolt against the bondage of the Archon. We owe our knowledge of them mainly to Irenæus, Clement, Origen, and Hippolytus: the last also contains an account of two other Ophite systems, that of the Sethians and of Justinus. Already in his day the sect was fast dying out, although Theodoret mentions serpent-worship as still existing in the 5th century.

See GNOSTICS, and the books named there; also Lipsius in the *Zeitschr. für Wissenschaftl. Theol.* (1863); Gruber, *Die Ophiten* (1864); and the Rabbi Dr Adolph Hönig's monograph, *Die Ophiten* (1889).

Ophitic Structure, name given by petrologists to a structure seen in various crystalline igneous rocks, in which large plates of a pyroxene are penetrated and divided, as it were, into small portions, by crystals of felspar. The separated portions of the pyroxene, however, are in crystalline continuity, since they all possess the same optic orientation.

Ophiuroidea. See BRITTLE-STARS.

Ophthalmia (derived from the Greek word *ophthalmos*, 'the eye') was originally and still is sometimes used to denote inflammation of the eye *generally;* but it is at the present time usually restricted to *inflammations* of the *conjunctiva* or mucous coat of the eye (*conjunctivitis*); and to two other diseases, *blepharitis tinea tarsi* or *ophthalmia tarsi*, and *sympathetic* inflammation or ophthalmia (see under EYE).

Ophthalmoscope, an instrument by which the interior of the eye can be examined. It was first invented in 1847 by Charles Babbage (q.v.); but, as unfortunately the ophthalmic surgeon to whom he showed it did not recognise its importance, he laid it aside without making it generally known; and its principle had to be rediscovered by Professor Helmholtz, to whom belongs the credit of bringing it before the medical and scientific world in 1851. The value of the instrument depends on the circumstance that by illuminating and examining an eye in the same direction its deeper parts can be rendered visible. All forms of ophthalmoscope are adaptations of this principle. The form now generally in use resembles more that of Babbage than that of Helmholtz. It consists of a concave mirror of about 10 inches focus, 1 to 3 inches in diameter, with a small hole in the centre, and certain lenses to use with it, the most important of them a separate convex lens of 2½ inches focus, and 1½ to 4 inches in diameter. Examination is facilitated by dilating the pupil of the observed eye with atropine; and for a complete examination this is often indispensable. The person whose eye is to be examined is seated in a darkened room, with a

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bright light—e.g. a good gas-burner—on a level with his eye by the side of his head. The observer sits opposite him, and placing the mirror close to his own eye, and about 18 inches from the eye to be examined, reflects the light upon the latter, while he looks at it through the hole. The pupil in a healthy eye appears of a bright red or orange instead of its usual deep black. In short-sighted and long-sighted eyes, but not in normal ones, the vessels of the retina, the entrance of the optic nerve, &c. can be more or less distinctly seen, and by their movements the deviation from the normal refraction can roughly be estimated. Opacities in the lens (Cataract, q.v.) or vitreous humour appear black, and are discovered by this method more certainly and easily than by any other. The details of the retina, choroid, &c. (or *fundus*) can be seen in two different ways. In the *indirect method* the observer, seated as above described, holds the 2½-inch convex lens about 3 inches from the eye under examination, between it and his own, when a clear real image of part of the fundus, inverted and magnified about four diameters, appears in the red light of the pupil. In the *direct method* the observing eye must be placed as close to the observed as the intervention of the mirror will allow, when a virtual image of a smaller part of the fundus is seen, but erect and magnified about fourteen diameters. The fundus appears of an orange or red colour, varying much in different individuals; the blood-vessels of the retina are seen as darker red lines coursing over it. The entrance of the optic nerve, commonly called the *disc*, from which these vessels diverge, appears as a round area of a much paler colour. The ophthalmoscope has revolutionised this department of medicine, as most of the deeper affections of the eye, particularly of the optic nerve, choroid, and retina, were before only recognisable after the eyeball was removed from the body. Some of these affections have, moreover, important relations to general diseases—e.g. Bright's disease, diabetes, syphilis, diseases of the brain and spinal cord—and general medicine has benefited accordingly. The ophthalmoscope has also much facilitated the discovery and correction of errors of refraction (short- and long-sightedness, Astigmatism, q.v.; and see under Eye).

Opie, John, R.A., was born at the village of St Agnes, 7 miles from Truro, Cornwall, in May 1761. His father, a master-carpenter, wished him to follow the same trade, but his bias for art was strong; and his attempts at portrait-painting secured the friendly help of Dr Wolcot ('Peter Pindar'). In 1780 he was taken to London by Dr Wolcot, and immediately came to be acknowledged by the fashionable world as the 'Cornish Wonder.' This tide of good-fortune soon ebbed, but not before Opie had realised a moderate competency. The loss of popular favour, however, only served to bring out Opie's manly independence and strong love of art, and he calmly entered on that department of painting which was then regarded as the only style of high art, namely, historical or scriptural subjects, executed on a large scale. His pencil was employed by Boydell in his well-meant and magnificent scheme to elevate British art; he also painted a number of works in the illustration of Bowyer's English History, Macklin's Poets and Biblical Gallery, and other similar undertakings. His pictures of the 'Murder of James I. of Scotland,' 'The Slaughter of Rizzio,' 'Jephtha's Vow,' 'Presentation in the Temple,' 'Arthur and Hubert,' 'Belisarius,' and 'Juliet in the Garden' are his most noted works. Opie was elected an Associate of the Royal Academy in 1786, and Academician in the following year. He wrote the 'Life of Reynolds' in Dr Wolcot's edition of Pilkington's *Dictionary of Painters*, and *An Inquiry into the Requisite Cultivation of the Fine Arts in Britain*; and delivered lectures on Art at the Royal Institution. Opie was twice married. He obtained a divorce from his first wife; his second was the novelist. He died April 9, 1807, and was buried in the crypt of St Paul's, near the grave of Reynolds.—Mrs Opie, the daughter of a Norwich physician, Dr Alderson, was born in 1769, and while very young wrote songs and tragedies, and was acquainted with Godwin, Mrs Inchbald, Mrs Siddons, and much of the literary society of the time. She was married to Opie in 1798. In 1801 her first novel, *Father and Daughter*, appeared; the following year, a volume of poems. *Adeline Mowbray* and *Simple Tales* were her next works. On her husband's death she returned to Norwich, and published his lectures with a memoir prefixed. She wrote also *Temper*, *Tales of Real Life*, *Valentine's Eve*, *Tales of the Heart*, and *Madeline*. Having been long acquainted with the Gurneys, Mrs Opie became a Quaker in 1825, and afterwards published *Illustrations in Lying*, *Detraction Displayed*, and articles in periodicals, but no more novels. She died at Norwich, 2d December 1853. See her *Memoirs* by Miss Brightwell (1854), and Miss Thackeray's *Book of Sibyls* (1883).

Opitz, Martin, German poet, born on 23d December 1597, at Bunzlau on the Bober, in Silesia, who for a century or more after his death was extravagantly praised as the 'Swan of Bober,' the 'Swan of Silesia,' the 'Father and Regenerator of German poetry.' This inflated reputation he had earned by toadying to the princes of Germany, by writing adulatory poems in their honour, by praising third and fourth rate poetasters, who recompensed him in kind. Although himself a Protestant, he worked and wrote for one Count Hannibal von Dohna, a cruel persecutor of the Protestants; but then Count Dohna helped him to get (1628) from the emperor a patent of nobility, and Ferdinand II. had with his imperial hand previously (1625) crowned him with the laurel crown of the poet—recognitions of his talent that Opitz valued above all things. He was summoned (1622) by Bethlen Gabor, Prince of Transylvania, to fill the chair of Philosophy and Polite Literature at Weissenburg; but at the year's end was so homesick, so wearied of the rude, martial people, and so famished through lack of the kind words of his friends, that he returned to Germany. Then he curried favour successively with the Duke of Liegnitz (1624), Count von Dohna (1626), and King Ladislaus IV. of Poland (1634), who made him his secretary and historiographer of Poland. But fate was against him: in 1620 he had fled from Heidelberg to Holland to escape war and the plague; now in Danzig, where he was living, he caught the plague from a beggar, to whom he gave a coin in the street, and died 20th August 1639. The poems Opitz wrote are like his ordering of his life, calculated: they owe their origin to the understanding, have no imagination, and little feeling, and are cold, formal, pedantic. The fact is, Opitz, originally a schoolmaster, schoolmastered poetry into lifeless imitation of pseudo-classic models. Poetry must, he propounded, in his most original work, *Buch von der teutschen Poeterei* (1624; new ed. 1876), teach and instruct as well as please. Hence his favourite pieces are purely didactic—*Trostgedicht in Widerwärtigkeit des Kriegs*, *Zlatna oder von der Ruhe des Gemüths*, *Vielgut oder vom wahren Glück*, *Vesuvius*, and others—such as the 'good boy' writes who wishes to please a pedantic master. Yet Opitz is entitled to the credit of having championed the use of his mother-tongue as against Latin, and of having actually used it. He also insisted upon the difference between the

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ancient prosody of feet and quantity and the modern prosody of accent and rhyme, emphasising the use of the last for German poetry, and recommending the Alexandrine form of verse as that best suited to the genius of his native tongue. His works include translations from classic authors (Sophocles and Seneca, whom he puts on exactly the same rank as dramatists), the Dutchmen Heinsius and Grotius (whom he sets up as models of style), and from the Bible. Through the men who swore by him—the so-called first Silesian school—Opitz reigned for nearly a century as a sort of posthumous literary dictator, a worthy rival of Gottsched.

The best editions of his *Gesammelte Schriften* are those that appeared in his lifetime (1637, 1641). See Lives by Strehlke (1856), Weinhold (1862), and Palm (1862), and critical works on the *Buch der Poeterei* by Borinski (1883), Fritsch (1884), and Berghöffer (1888).

Opium, one of the most valuable of medicines, is the dried juice of the unripe capsules of a species of Poppy (q.v.), *Papaver somniferum*, of which several varieties are cultivated, the most usual in India, Persia, and China being apparently the variety *album*. The cultivation of the poppy for the sake of opium is carried on in many parts of India, although the chief district is a large tract on the Ganges, about 600 miles in length and 200 miles in breadth, which is divided into two *agencies*, that of Behar and that of Benares, the central factory of the former being at Patna, and that of the latter at Ghazipur. The poppy is also extensively cultivated for opium in the Asiatic provinces of Turkey, in Egypt, in Persia, and in China; and opium of fair quality is produced, although not to any considerable amount, in some parts of Europe, and even in Britain.

The poppy requires for its profitable cultivation a rich soil, and in India is generally sown in the neighbourhood of villages where manure can be easily obtained. The soil ought to be fine and loose when the seed is sown. The subsequent cultivation consists chiefly in thinning and weeding. Irrigation is practised. Mild moist weather, with night-dews, is deemed most favourable during the time of the collection of the opium. Very dry weather diminishes the flow of the juice, and much rain is injurious. The opium poppy is cultivated for its seed or oil and other purposes besides the production of opium, concerning which see POPPY.

Opium, as a commercial article, is of great importance, exceeding indeed that of any other drug in use. The cultivation of the opium poppy in British India forms a most extensive branch of agriculture, and the collection and preparation of the drug itself employs a large number of persons. The seed is sown in India in the beginning of November; it flowers in the end of

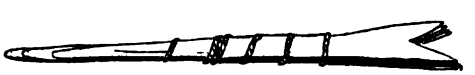

Fig. 1.

January, or a little later; and in three or four weeks after the capsules or poppy-heads are about the size of hens' eggs, and are ready for operating upon. When this is the case the collectors each take a little instrument (fig. 1), made of four small knives tied together, the blades appearing like the teeth of a comb; with these instruments they wound each half-ripe poppy-head (fig. 2) as they make their way through the plants in the field. This is always done in the afternoon, and on the following morning the milky sap is collected by scraping it off with a kind of scoop, and transferred to an earthen vessel hanging at the side of the collector. When this is full it is carried home and placed in a shallow open brass dish, and left for a time tilted on its side, so that any watery fluid may drain out; this watery fluid is very detrimental to the opium unless removed. It now requires daily attention, and has to be turned frequently, so that the air may dry it equally, until it acquires a tolerable consistency, which takes three or four weeks; it is then packed in small earthen jars, and taken to the factories, where the contents of each jar are turned out and carefully weighed, tested, valued, and credited to the cultivator. The opium is then thrown into vast vats, which hold the accumulations of entire districts, and the mass being kneaded is again taken out and made into balls or cakes for the market. After being fully dried these balls are packed in chests for the market. Of the Indian opium there are several qualities, as Patna, Benares, Malwa, &c. The area under cultivation in India with the poppy varies from year to year; in some years the area in Bengal alone has been as high as 560,000 acres. Certain districts are permitted to cultivate the plant, but the cultivators must obtain a license. Government purchases the opium at about 10s. a seer of 2 lb., and an acre yields from 10 to 15 seers of opium over and above the petals, capsules, and seed.

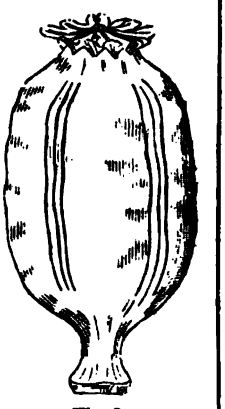

Fig. 2.

In Persia the drug is prepared at Ispahan, Shiraz, and Yezd; the latter is considered the best. The morphia in Persian opium is only 2 to 8 per cent., against 7 to 11 per cent. in Turkish opium. In Khorassan the cultivation of the poppy increased tenfold between 1875 and 1890. A quantity of opium for local consumption is prepared in the shape of sticks or cylinders. That destined for China is mixed with linseed-oil in the proportion of 6 or 7 lbs. to each chest; but that sent to London is pure. The exports of Persian opium, which in 1874 and 1875 were only 2000 chests, rose before 1890 to 7700 chests. In Turkey the production is also large.

For the relation of the opium trade to the revenue of British India, see INDIA, Vol. VI. p. 115. There has been a good deal of controversial discussion carried on of late years as to the effects of opium-smoking (see below), and the abolition of the Indian trade is by many earnestly demanded. Those who support the present fiscal system of India say it is on the whole better that the preparation and sale of Indian opium should be in the hands of the government as a monopoly, for if abandoned by them its culture and manufacture would be carried on in many other localities favourable to the growth of the poppy. Indeed its culture has been already tried in Australia, Africa, and parts of America. It should also be remembered that China itself produces opium largely; there is virtual permission and open connivance of all the local authorities at the culture of the poppy over the length and breadth of the empire. Professedly forbidden, its culture is free to all. The local production of opium is indeed believed to be as large as the foreign import, since the authorities prefer to quietly encourage the home-grown produce, so as to prevent the export of bullion for the foreign. In south-western China the production of opium is stated to exceed 280,000 cwt., and it sells at two-thirds the price of the Indian.

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In 1880 the annual revenue from opium in India was nearly £10,500,000, of which the excise opium (or that locally consumed) yielded £1,000,000, and the 'provision' or export opium the rest. But the net revenue has declined by over £2,500,000. About 40,000 chests (of 140 lb.) are produced in the native states of Central India, Rajputana, and Baroda, which pay a transit duty for export from Bombay. The following figures (in cwts.) show the decline in the export, and the countries to which the Indian opium goes.

	1880.	1890.
Hong-kong	83,055	76,426
Treaty Ports	46,046	19,997
Cochin-China		1,541
Straits Settlements	15,417	20,184
Other Countries	120	353
Total	144,638	118,596

In 1860 the chest of Indian opium fetched £185; but it gradually dropped to £111, although rather better prices were obtained in 1889. It is sold monthly by public auction at Calcutta. To prevent speculation and to steady prices, the quantity to be sold during the year is duly notified in the previous year. The bulk of the Indian opium, it will be seen, still finds its way to China. Persian opium, like the Chinese, has increased greatly in recent years, and, being cheaper than the Indian article, has begun to have a distinct effect upon the market. The foreign exports from India by no means represent the total trade in the drug. There is an immense internal consumption of what is known as 'excise opium,' averaging about 4500 chests yearly. This is retailed to the Indian consumer as a decoction, or in the form of two smoking mixtures, *chandu* and *madak*.

The quantity of the different kinds of opium imported into China (added to the stock held in bond from the previous year) was in 1889 as follows, in piculs of about 1⅓ cwt. each.

Malwa	36,200
Patna	26,165
Benares	18,177
Persian	3,414
Turkey	2,414
Total	86,370 = 108,000 cwt.

The net imports into China were, in 1888, 82,612 piculs, and in 1889, 76,052 piculs. The likin or local duty and the import duty amount to 110 taels per chest, or about £26. From 1830 to 1840 the imports of foreign opium into China amounted to 20,619 piculs; from 1840 to 1850 they increased to 52,925 piculs. In 1860, when the trade was legalised, the imports reached 89,744; in 1870, 95,043; in 1880, 96,839; and in 1889 they fell to 76,040 piculs. The imports of opium into Great Britain average 600,000 to 700,000 lb. annually. This is chiefly re-exported —about 140,000 lb. to the United States, and over 200,000 lb. to South America and the West Indies. The United States imports nearly 600,000 lb. of crude opium, and from 45,000 to 75,000 lb. of opium prepared for smoking.

In Europe opium is mainly used for medicinal purposes, and large quantities of it undergo further manufacture, in order to separate from it the active principles morphine, narcotine, &c. In Great Britain the chief manufacture of these salts of opium is carried on in Edinburgh, where two firms manufacture these products upon an immense scale, supplying probably a fifth of the whole quantity manufactured.

Chemical Properties, &c.—All kinds of opium have a bitter, nauseous taste, and a peculiar narcotic, heavy odour. Chemically it is a gum-resin containing a very large number of alkaloids, meconic and other acids, and the ordinary constituents of a plant juice. Its exact composition varies greatly, but is somewhat as follows: *Alkaloids*—morphine (4–15 per cent.), narcotine (4–6 per cent.), thebaine, codeine, narceine, papaverine (of each from about ½–1 per cent.), cryptopine, rhoeadine, laudanine, laudanosine, pseudomorphine, codamine, meconine, protopine, laathopine, papaveramine, oxynarcotine, hydrocotarnine, gnoscopine, tritopine, and others, all in very small amount. They exist free or in combination with meconic, lactic, sulphuric, and phosphoric acids. There is about 8 per cent. of saccharine matter, about 35 per cent. of gum, resin, fat, albumen, &c., various inorganic bases, and a variable amount of water. It may be adulterated with sugar, gum, or molasses, and sometimes contains nails, lead, or stones in the centre of the mass.

The chief and most easily applied chemical test for opium depends on the presence of meconic acid, which is an organic acid peculiar to it. A watery or alcoholic solution turns blood-red in colour on the addition of a solution of perchloride of iron, and this colour is discharged by a solution of protochloride of tin. Its smell and taste are also very characteristic. Turkey opium is generally considered the best, and in the British Pharmacopœia it alone is directed to be used for making the official pharmaceutical preparations (twenty in number). Before use it must be dried and powdered, and standardised to a strength of as nearly as possible 10 per cent. of morphine. For making the officinal alkaloids any kind of opium may be used. A method of assaying the amount of morphine in it is given with great detail in the British Pharmacopœia.

Action and Medicinal Uses.—The action of opium depends on its alkaloids, and is chiefly determined by the morphine present in it. Ordinary medicinal doses (½ to 3 grains) depress the activity of the brain and cause deep sleep with contracted pupils, slow respiration, and insensibility to pain. On awakening there are usually disagreeable after-effects, such as loss of appetite, slight nausea, constipation, mental fatigue, and headache. When minute doses are taken there ensue symptoms of excitement and stimulation, as shown by increased mental and bodily activity, restlessness and sleeplessness. The imagination is more active, and mental work can be accomplished with greater ease and celerity. It is disputed whether these effects are due to actual stimulation of the brain, or whether the higher centres are blunted, and thus allow the imaginative faculties to have fuller play. Most probably the latter is the case. Self-consciousness and self-criticism are lulled, the judgment is less controlled by the higher centres and by impressions from without, and left to itself part of the brain lapses into uncontrolled activity. It is for these reasons that opium is habitually used by some brain-workers. Individual susceptibility and race influence its effects very largely. The Teutonic races and phlegmatic people in general tend to sleep after it, while Easterns and persons of highly nervous temperament tend to become excited. Man, owing to the greater development of his brain, is somewhat differently affected from the lower animals. Frogs, after a primary stage of narcosis, pass into a condition of exquisite tetanic spasm from stimulation of the spinal cord, and the lower mammalia exhibit the same condition to a lesser degree. In adult man tetanic convulsions are rarely seen, and only occasionally after enormous doses; but in children convulsions are not infrequent, the explanation given being that in them the spinal cord is relatively largely developed in proportion to the brain. Opium diminishes all the secretions except the sweat, and thus causes constipation. It does not materially affect the heart or circulation in medicinal doses.

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When opium is used habitually a tolerance for it becomes established, and enormous doses may be taken without any special effects. In medicine it is used chiefly to procure sleep and relieve pain. For these purposes it has no equal. It is also employed to arrest secretions, to allay irritation, and in diarrhœa. In diabetes, heart disease, hæmoptysis, and many other conditions it is given with great advantage. Probably no remedy has such wide and universal applications.

It must be given with great caution to young children, but many other factors, such as pain, habit, idiosyncrasy, and various diseases influence its action and dosage.

Poisoning.—About half the deaths from poison which occur in the United Kingdom are due to opium or its preparations. When the effects of a large dose become fully developed the person lies in deep coma and in a state of complete insensibility. Respiration is slow, noisy, and stertorous, the pupil is contracted to a 'pin-point,' and insensible to light, the pulse is rapid and weak, or sometimes full and slow, the face and skin generally are pale and livid, and covered with cold perspiration. Constant stimulation may rouse the patient partially, but he always tends to relapse into stupor. Death is due to paralysis of the respiratory centres in the brain, but may be due to apoplexy or collapse. Such are the usual symptoms, but many cases present peculiar features, such as convulsions, vomiting, diarrhœa, delirium, dilated pupils, and other anomalous symptoms. The *post-mortem* appearances are not characteristic, but the cerebral blood-vessels are usually very full, and there may be effusion of serum into the ventricles. The smallest fatal dose recorded for an adult is four grains, but enormous quantities are often taken without serious symptoms. In infants very minute doses ($\frac{1}{8}$ to $\frac{1}{4}$ grain) may prove fatal. Death may occur in about two hours or even less; few cases are prolonged beyond twenty-four hours.

The treatment consists in making the patient vomit, and in washing out the stomach with large quantities of water. Owing to the state of insensibility emetics sometimes fail to act. Atropine is often given subcutaneously, while coffee or tea or caffeine may be also freely given. The patient may be further aroused by keeping him moving about supported by attendants, by cold cloths applied to the chest, and by electric stimulation. Any violence or measures which tend to exhaust the patient should be carefully avoided.

Opium-eating.—The habitual consumption of opium or any of its preparations by persons otherwise in good health is known as opium-eating, the opium habit, morphine habit, or morphinism. Opium, laudanum, chlorodyne, black drop, nepenthe, morphine, and other forms are all used. They are most commonly taken by the mouth, the subcutaneous injection of Morphine (q.v.) being almost entirely confined to the more cultured and educated classes. Its habitual use is usually begun to relieve pain or sleeplessness, and one month's constant use is said to be sufficient in many cases to confirm the habit. The amount consumed by different individuals varies greatly. Of morphine most habitués take about three grains daily, some five or six grains, while a few go much higher. De Quincey says that at one time of his life he consumed 8000 drops of laudanum daily, but his ration was very excessive. The immediate effects are a feeling of stimulation and well-being, but as soon as these have passed off there ensues a state of despondency, to banish which a fresh dose is taken. It is a craving brought on by indulgence, and is to be ranked with such habits as drinking, smoking, gambling, &c. Many persons indulge this craving during their whole life, and do their daily work well. Such persons do not, however, go to any great excess, although they may have the craving as markedly as others who suffer intensely from well-developed symptoms of chronic opium poisoning. The typical opium-eater is lean and pale, with dull, glazy eyes; he suffers from chronic dyspepsia, from nervous irritability, and disturbances of the circulation. Albuminuria, glycosuria, and various other disorders are sometimes present. Sudden deprivation causes severe nervous disturbances and not seldom alarming collapse. For successful treatment of the opium craving the patient had better be removed from his own home and friends to some institution where he can be under strict and constant medical supervision. There is a difference of opinion as to whether the opium should be abruptly or gradually withdrawn. Recovery is generally complete in a few weeks, but relapses into the habit are exceedingly apt to occur.

Opium-smoking.—The smoking of opium as a stimulant-narcotic is practised chiefly in China, India, Borneo, and the far East. In China probably about 1 per cent. of the entire population smoke opium, but the habit is growing rapidly. In 1767 only about 200 chests of opium were imported yearly, while in 1854, 78,000 chests were needed. Fines, penalties, and even death have been found ineffective to stop the practice. Opium prepared for smoking is called *chandu*, which is simply a watery extract, about twice the strength of the original drug. A special form of pipe is used, a piece of prepared opium about the size of a pea is placed, by means of a small flattened iron pen, into a small cup at one end; this is ignited and the smoke inhaled, and then slowly exhaled through the nostrils. As a result, Easterns experience mental and physical excitement, followed by a pleasant sense of well-being and content, and then narcosis. Europeans, as a rule, are not affected by it to any appreciable extent. In the pipe the opium is destructively distilled, and chiefly the products of destructive distillation come over in the smoke—pyridine, collidine, and similar bases. There is probably scarcely a trace of morphine. The flavour of the smoke is mild and aromatic. In China and Singapore there are public smoking-houses, but it is also largely practised in private. It is reported that there are a million opium-smokers in the United States, especially in San Francisco and New York.

There is great difference of opinion regarding the hurtfulness of the habit. Some authorities hold that in moderation it is not more hurtful than tobacco, while missionaries and others maintain that the habit is fraught with moral, social, and individual degradation. This seems to depend largely on the extent to which it is carried, and the question is probably on all fours with that of alcohol in this country. Many Chinese smoke opium all their lives in strict moderation without apparent harm, while others have excessive debauches lasting a week or more, and often become confirmed in its excessive use. The latter without doubt wreck their constitutions and suffer in much the same way as confirmed alcoholics do.

See the articles LAUDANUM, MORPHINE, POISONS; the medical works on stimulants and narcotics. As to the harmfulness of the use of opium, see Calkin, *Opium and the Opium Appetite* (Phila. 1870); H. H. Kane, *Opium-smoking in America and China: a Study of its Prevalence and Effects* (New York, 1882); the publications of the Society for the Suppression of the Opium Trade (founded 1874); W. J. Moore, *The Other Side of the Opium Question*, and W. H. Brereton, *The Truth about Opium* (both published in 1882, and in defence of the opium trade); Vignet, *Étude sur L'Opium* (Paris, 1875); Wiselius, *De Opium in Nederlandsch en Britisch Indie* (Hague, 1856). For the Opium Wars, see CHINA, Vol. III. p. 192.

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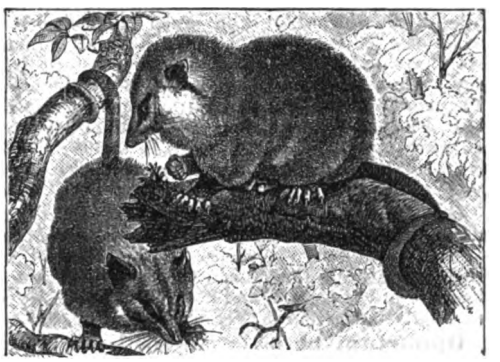
Opodeldoc is a popular synonym for soap *Liniment* (q.v.). The origin of the term, which was apparently applied by Paracelsus to various forms of liniments or local applications, is not known. The *opo* is the same as the *opo* of *opopanax*, *opobalsamum*, &c., and is doubtless derived from the Greek *opos*, 'juice.' See *Notes and Queries*, October 1888, p. 316.

Opo'panax, a gum-resin obtained in Persia, which comes to Europe at rare intervals. It has an unpleasant odour resembling bruised ivy leaves. Holmes suggests that it may be the produce of some Araliaceous plant, but nothing is known of its botanical origin. The ancient physicians attached great importance to it as an antispasmodic medicine; Hippocrates, Theophrastus, and Dioscorides have each left descriptions of it. The plant *Opopanax chironium*, from which it was supposed to be obtained, grows generally throughout southern Europe. The perfume known as opopanax is not derived from this gum-resin. There is a commercial opopanax, a kind of perfumed myrrh, obtained from a Balsamodendron, largely imported into Germany, where an essential oil is distilled from it.

Oporto (Port. *O porto*, 'the port'), the second city of Portugal, stands on the steep, rocky, right bank of the Douro, high above its waters, which reach the sea 3 miles to the west. 'The houses, as they rise confusedly from the river's edge, some painted in strong reds, blues, or greens, some left whitewashed, and the majority retaining the granite gray of the stone they are built with, make up a very strange and beautiful panorama, ringed as the city is by the encircling pine-covered mountains' (Oswald Crawfurd); and many of these houses stand embowered in the greenery of gardens. One of the crags overlooking the river is crowned with a Crystal Palace (1865), surrounded by gardens. Many of the former monasteries are still standing, though put to other uses: one is a citadel, another the exchange, with splendid marquetry of wood in floor and walls, a third barracks, and so on. There are seven principal churches, including the cathedral (built by Henry the Navigator), the old Gothic church of Cedofeita (originally founded in 559), and the Church dos Clerigos, with a tower 213 feet high. The English factory (1785), the bishop's palace, and the hospital of St Antony are the most noticeable amongst the secular buildings. Oporto possesses a polytechnic academy, with observatory, scientific collections, &c., a medical school, a fine art academy, a commercial museum, an industrial institution, a library (1796) of 200,000 vols. and 9400 MSS., and two picture-galleries. On the south side of the river, immediately opposite Oporto, and connected with it by a lofty bridge, is the suburb of Villa Nova de Gaia, with a pop. of 9126, and extensive wine-cellars. The railway to Lisbon (209 miles) crosses the river a little higher up, on one of the finest (steel) arch bridges built; the arch spans a horizontal distance of 549 feet, and its centre is 203 feet above the river. The pop. of Oporto was (1878) 105,838. They are chiefly engaged in the manufacture of cloth and silks, hats, porcelain, ribbons, tobacco, soap, and candles, in metal-casting, tanning, brewing, distilling, cork-cutting, sugar-refining, and brick-making, and in commerce and shipping. Oporto is the principal place of export for Port Wine (q.v., and also PORTUGAL). The remaining exports of moment are cattle, oranges and other fruits, cork, copper, onions, meat, hides, and wool, the total value of all exports reaching on an average £3,550,000. The imports, consisting chiefly of corn and flour, cod-fish, metals, machinery, textiles, rice, raw sugar, hides, coal, and timber, amount to £1,800,000 annually.

Originally the *Portus Cale* of the Romans (whence Portugal), this city was the stronghold of the Christians in the north-west of the Iberian peninsula against the attacks of the Moors, and more than once changed hands between the 8th and the 12th centuries. The people are noted for their sturdy patriotism and liberal sentiments; in 1808 they were especially hostile to the French; they stoutly opposed the usurper Miguel (1828), who in revenge executed great numbers of its people, but without breaking their spirit, for they supported Pedro of Brazil, and withstood the besieging troops of Miguel thirteen months (1832-33). It was the scene of frequent republican riots in the 19th century. See O. Crawfurd in *New Review* (1889).

Opossum (*Didelphys*), a genus of Marsupialia, having ten incisors in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side—fifty teeth in all; the tail generally very long, prehensile, and



Virginian Opossum (*Didelphys virginiana*).

in part scaly; the feet plantigrade; five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits. The pouch, so characteristic of marsupials, is generally absent, sometimes rudimentary, rarely complete. The unwebbed feet and non-aquatic habits distinguish this genus from Cheironectes (q.v.), also belonging to the family Didelphidæ. The name opossum has also been applied to certain Australian forms, but is better restricted to the American opossums, which are the only marsupials found in America. They range from the United States to the Argentine Republic. There are altogether twenty-three distinct species, with a considerable range in size, varying from that of a large cat to that of a mouse. The best known is the Virginian Opossum (*D. virginiana*). Among the marsupials they are nearest allied to the Dasyuridæ, from which they are doubtfully separable; if it were not for their geographical range, they would undoubtedly be placed in the same family. Although there are now no opossums found anywhere but in America, they existed formerly in Europe, as is shown by their fossil remains. The opossums are all carnivorous, one species, the Crab-eating Opossum, feeding—as its name denotes—upon crabs; in order to capture its prey it frequents marshy places. It is a native of tropical America. Merian's Opossum (*D. dorsigerus*) is remarkable for the fact that it carries its young on its back, their tails being twined round the tail of the mother; many other species carry the young on the back; this is due in many cases to the fact already mentioned—that

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there is no pouch. The Virginian Opossum is a foe to poultry-yards in the United States; but it can put up with frogs if there is nothing better to be had. The opossums, like other marsupials, have a lowly organised brain; but they are remarkably cunning in robbing poultry-yards; on the other hand, their stupidity in walking straight into the simplest and most obvious trap is more in accord with their brain structure. Hunting the opossum with dogs by night is a favourite sport in the southern states, especially in autumn, when the body has a thick layer of fat all over. The animal takes refuge in a tree, and is either shaken down or shot as it hangs by the tail. The expression 'playing possum' refers to the opossum's habit of feigning death when caught. At such times, though usually very timid, it will endure almost any amount of torture, and give no sign of its suffering.

Opoteca, a sleepy town of 1000 inhabitants, in Honduras, about 15 miles NNW. of Comayagua, formerly famous for its great silver-mines.

Oppeln, a town of Prussian Silesia, on the Oder, 51 miles SE. of Breslau. Since 1816, when it was erected into a seat of government for Upper Silesia, the town has been much beautified both with new edifices and with parks and gardens. Its church of St Adalbert was founded in 995; and there is an old castle on an island in the Oder. The manufactures include pottery, cigars, cement, beer, leather, &c., and there is a considerable trade in grain and cattle. Pop. (1875) 12,498; (1885) 15,975. See Idzikowski's *Geschichte der Stadt Oppeln* (1863).

Oppenheim, a town of Hesse-Darmstadt, on the left bank of the Rhine, 20 miles SSE. of Mainz by rail, with fine vineyards. On the site of the Roman castle of Bauconica, Oppenheim became a free city of the empire, and was repeatedly besieged, especially in the Thirty Years' War. Pop. 3452.

Opportunists, in French politics, are those who, like Gambetta, Ferry, and others like-minded, oppose doctrinaire as well as extreme views, accommodate themselves in great measure to the circumstances of the hour, and aim only at what can obviously be carried through.

Optical Illusion. An object appears large or small, near or distant, according as the rays from its opposite borders meeting at the eye form a large or a small angle: when the angle is large, the object is either large or near; when small, the object must be small or distant. Experience alone enables us to decide whether an object of large apparent size is so on account of its real size, or of its proximity; and our decision is arrived at by a comparison of the object *in position* with other common objects, such as trees, houses, &c., which may chance to be near it, and of which we have by experience come to form a correct idea. The same is, of course, true of apparently small objects. But when all means for comparison are removed our judgment is at fault. Similarly, we erroneously infer spherical solids at a distance to be flat discs; and, by reason of Irradiation (q.v.) in the eye, the sun appears larger than he would if illumined by a fainter light, and a man in a white habit seems larger than he would if he wore a dark dress. Illusions are also produced by external causes; and instances of this sort are given under MIRAGE, REFLECTION, and REFRACTION.

The persistence of impressions on the retina for about one-sixth of a second after the object which produced the impression has been removed produces another class of illusions. Common examples of this are the illuminated circle formed by the rapid revolution of an ignited carbon point, piece of red-hot iron, or other luminous body, and the fiery curve produced by a red-hot shot projected from a cannon.

Another form of illusion is produced to a person who is seated in a vehicle in motion; and it is very deceptive when the motion is so equable as not to be felt by the person himself. The illusion is most complete when the attention is riveted on an object several yards off; this object then appears to be a centre round which all the other objects revolve, those between the observer and the object moving backwards, and those beyond the object moving forwards. This illusion occurs on a large scale in the apparent motion of the heavenly bodies. Other illusions arise from a disordered state of the organs of vision: e.g. the seeing of things double or movable, or of a colour different from the true one (see COLOUR-BLINDNESS); the appearance as of insects crawling over a body at which the eye is directed, &c.

Optic Nerve. See EYE.

Optics is the science of the phenomena of light. This science is usually treated under two heads: (1) Physical Optics, which treats of the nature of Light (q.v., as also MAGNETISM and UNDULATORY THEORY), and explains the phenomena of Colour, Reflection, Refraction, Interference and its consequences, such as the colours of thin plates and films, Diffraction, Dispersion, the Spectrum, Polarisation and the properties of polarised light, for which see separate articles; and (2) Geometrical or Mathematical Optics. The leading idea in physical optics is to trace the progress of an undulatory or oscillatory disturbance in the Ether (q.v.); this disturbance, which may be termed a wave, has an advancing wave-front; the direction along which this wave-front advances through a given point is a geometrical conception, which it is convenient to make use of in diagrams, more convenient than it would be to draw a series of successive wave-fronts; this direction of propagation through any given point is called a ray; and geometrical optics traces, by mathematical reasoning, the course of a given set of 'rays' under specified conditions, particularly under those which have reference to Reflection and Refraction (q.v.). The part of geometrical optics which deals with reflection of light is often called Catoptrics (based on such laws as that the angle of reflection is equal to the angle of incidence); that which deals with refraction is called Dioptrics: and for an account of these, reference is made to articles REFLECTION and REFRACTION respectively.

Though the Greeks and their disciples the Arabs had made some progress in mathematical optics, their knowledge was confined to the law of reflection and its more immediate consequences. Euclid, Aristotle, Archimedes, Hero, and Ptolemy were acquainted with the fact that light is transmitted in straight lines; but, with the important exception of Aristotle and some of his followers, the ancient philosophers believed that rays proceeded *from* the eye *to* the object, instead of in the contrary direction. Ptolemy was well acquainted with atmospheric refraction. Alhacen (1070) and Vitellio the Pole (1260) were almost the only cultivators of this science during the middle ages, and their additions to it were unimportant. The lens, though known from early antiquity, was not applied as an aid to defective eyesight till after the time of Roger Bacon. Jansen, Metius, and Galileo separately invented the telescope about the beginning of the 17th century; and the last-mentioned philosopher by its means made various important astronomical discoveries. Kepler, a short time after, gave the true theory of the telescope, explained the method of finding the focal length of lenses, and applied it to find the magnifying power of the telescope,

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besides pointing out the mode of constructing an instrument better adapted for astronomical purposes than that of Galileo; he also made some useful experiments on the nature of colours, and showed that images formed on the retina of the eye are inverted, a fact previously discovered by Maurolycus of Messina. From this period the science of optics steadily advanced, and its treasury of facts received numerous additions through the labours of De Dominis, Snell (the discoverer of the law of refraction in 1621), Descartes, Fermat, Barrow, Mariotte, and Boyle. Up to the time of Newton it was generally believed that colour was *produced* by refraction, but that philosopher showed by a beautiful series of experiments that refraction only separates the colours already existing in white light. In his hands the theory and construction of the telescope underwent many valuable improvements, and in 1672 the description of his *reflecting* telescope was submitted to the Royal Society. Gregory had constructed an instrument on similar principles some years before. About the same time Grimaldi made his interesting series of experiments on the effects of diffraction, and noticed the remarkable fact of the interference of one pencil of light with the action of another. The theory of the rainbow, with an elegant analysis of the colours of thin plates, and the hypothesis concerning the nature and propagation of light, now known as the 'corpuscular' theory (see LIGHT), completed Newton's contributions to the science. The important services of the ingenious but eccentric Hooke cannot be easily stated in a brief abstract, as he discovered a little of everything, completed nothing, and occupied himself to a large extent in combating faulty points in the theories of his contemporaries. It must not, however, be forgotten that he has as much right as Huygens to the credit of originating the undulatory theory. The double refraction of Iceland spar was discovered (1669) by Bartholin, and fully explained in 1690 by Huygens, the propounder of the undulatory theory, who also aided the progress of mathematical optics to a considerable extent. The velocity of light was discovered by Römer (1675), and in 1720 the aberration of the fixed stars and its cause were made known by Bradley, who likewise determined with accuracy the amount of atmospheric refraction. Bouguer, Porterfield, Euler, and Lambert rendered essential service to physical optics; the same was done for the mathematical theory by Dollond (the inventor of the achromatic telescope), Clairaut, D'Alembert, Boscovich, &c.; while in later times the experiments of Delaval on the colours produced by reflection and refraction; the discussion of the phenomena arising from unusual reflection or refraction carried on by Vince, Wollaston, Biot, Monge, and others; the discovery of polarisation of light by Malus (1808), and its investigation by Brewster, Biot, and Seebeck; of depolarisation by Arago (1811), and of the optical properties as connected with the axes of crystals (1818) by Brewster; and the explanation of these and other optical phenomena in accordance with the undulatory hypothesis by Young—the discoverer of the *Interference* (q.v.) of rays—and Fresnel, went far to give optics a width of scope and a symmetry which are possessed by few other sciences. The development of the undulatory theory and of optical science generally has been carried on in the present century by Lloyd, Airy, Cauchy, Clerk-Maxwell, Hertz, and others; and for an account of the present state of the science reference may be made to Mr Thomas Preston's *Theory of Light* (1890), in addition to the works mentioned under LIGHT, and the articles LENSES, MICROSCOPE, TELESCOPE, &c.

Optimism (Lat. *optimus*, 'best'), the doctrine that the existing order of things, whatever may be its seeming imperfections of detail, is nevertheless, as a whole, the most perfect or the best which could have been created, or which it is possible to conceive. Some of the advocates of optimism content themselves with maintaining the absolute position, that, although God was not by any means bound to create the most perfect order of things, yet the existing order is *de facto* the best; others contend that the perfection and wisdom of Almighty God necessarily require that His creation should be the most perfect which it is possible to conceive. The philosophical discussions of which this controversy is the development are as old as philosophy itself, and are dealt with in the article on the origin of Evil (q.v.). But the full development of the optimistic theory as a philosophical system was reserved for Leibnitz (q.v.), in his *Theodicée*, the main thesis of which is that, among all the systems which presented themselves to the infinite intelligence of God as possible, God selected and created in the existing universe the best and most perfect, physically as well as morally, regard being had to the universe as a whole. The *Theodicée* was designed to meet the sceptical theories of Bayle, and its theories were ridiculed in Voltaire's *Candide*. Modern discussion on this question usually assumes the form of assertion or denial of the opposite doctrine of Pessimism (q.v.).

Opuntia. See PRICKLY PEAR.

Opus Operatum (Lat., literally 'the work wrought') is the phrase employed in the Catholic theological schools to describe the manner of operation of the sacramental rites in the production of grace. It is intended to imply that the ministration of the rite (*opus*) is in itself, through the institution of Christ, an efficient cause of grace, and that, although its operation is not infallible, but requires and presupposes certain dispositions on the part of the recipient, yet these dispositions are but *conditiones sine qua non*, and do not of themselves produce the grace. Hence, when the sacraments are administered to dying persons in a state of apparent insensibility, this is done in the hope and on the presumption that the dying person may, though seemingly unconscious, be nevertheless really disposed to receive the sacrament; but it is by no means held that if these dispositions be wanting the sacrament will itself justify him.—The phrase *Opus Operantis* is frequently used as denoting that the effect of a particular ministration or rite is primarily and directly due, not to the rite itself (*opus*), but to the dispositions of the recipient (*operans*). Thus, in the act of kissing or praying before a crucifix, of sprinkling one's self with holy water, of telling the prayers of the rosary upon blessed beads, the fervour and personal piety of the supplicant, and not the material object of the religious use, is held to be the efficient cause of the grace which is thereby imparted.

Orache (*Atriplex*), a genus of plants of the natural order Chenopodiaceæ, having male and female flowers on the same plant. The species are numerous and widely spread over the maritime or saline parts of the earth, scarcely any species except the Common Orache (*A. patula*) being ever found inland or away from saline influence. Five species, including the Garden Orache (*A. hortensis*), are natives of Britain. Although formerly much cultivated in Britain, orache is now displaced as a pot-herb by spinach (*Spinacia oleracea*), a species of a closely allied genus. All the species have similar qualities, and may be used as spinach.

Oracle, the response delivered by a deity or supernatural being to a worshipper or inquirer; also the place where the response was delivered. These responses were supposed to be given by a certain divine afflatus, either through means of

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mankind, as in the orgasms of the Pythia and the dreams of the worshipper in the temples; or by its effect on certain objects, as the tinkling of the caldrons at Dodona, the rustling of the sacred laurel, the murmuring of the streams; or by the actions of sacred animals, as exemplified in the Apis or sacred bull of Memphis, and the feeding of holy chickens among the Romans. Such responses were, however, closely allied to augury, which differed in this respect, that auguries could be taken anywhere, while the oracular spots were defined and limited. Oracle dates from the highest antiquity, and gradually declines with the decline of Animism (q.v.) and with the increasing knowledge of mankind. Among the Egyptians all the temples were probably oracular. In the hieroglyphic texts the gods speak constantly in an oracular manner, and their consultation by the Pharaohs is occasionally mentioned. In later days the most renowned of these oracles was that of Ammon in the Oasis, where oracular responses were rendered either by the shaking of the statue of the god or by his appearance in a certain manner. Oracles were also used by the Hebrews, as in the consultation of the Urim and Thummim by the high-priest, and the unlawful use of Teraphims, and consultations of the gods of Phœnicia and Samaria. The Hebrew oracles were by word of mouth, as the speech of God to Moses, dreams, visions, and prophetical denunciations; besides which there were oracles in Phœnicia, as that of Beelzebub and others of the Baalim. They were also in use throughout Babylonia and Chaldæa, where the responses were delivered by dreams given to the priestesses, who slept alone in the temples as concubines of the gods. The most renowned of all Greek oracles was the Delphic oracle (see DELPHI), which was Panhellenic or open to all Greece. Sacrifices were offered by the inquirers, who walked with laurel crowns on their heads, and delivered in questions inscribed on leaden tablets (of which many have been recently discovered); the response was deemed infallible, and was usually dictated by justice, sound sense, and reason. Other oracles of Apollo were at Abæ in Phocis; at Ptoon, which was destroyed in the days of Alexander the Great; and at Ismenus, south of Thebes. In Asia Minor the most celebrated was that of Branchidæ, close to Miletus, celebrated in Egypt, Gryneum, and Delos. Besides that of Dodona, Zeus had another at Olympia; and those of various other deities existed elsewhere. A secondary class of oracles of heroic or prophetic persons existed in Greece, the two most celebrated of which were those of Amphiaraus and Trophonius. The first mentioned was one of the five great oracles in the days of Crœsus, and was situate at Oropus in Attica. Those who consulted it fasted a whole day, abstained from wine, sacrificed a ram to Amphiaraus, and slept on the skin in the temple, where their destiny was revealed by dreams. That of Trophonius was at Lebadea in Bœotia, and owed its origin to a deified seer. It was given in a cave, into which the votary descended, bathed and anointed, holding a honeyed cake. There were some other oracles of minor importance. Besides these oracles, written ones existed of the prophecies of celebrated seers, as Bacis and Musæus, which were collected by the Pisistratidæ, and kept in the Acropolis of Athens. Others of the Sibyls or prophetic women were popular, and at a later period (see SIBYLS) Athenais and others prophesied in the days of the Seleucidæ. Amongst the oriental nations, as the Arabs and others, divination was and is extensively practised, but there are no set oracles. The Celtic Druids are said to have delivered responses, and the oracle of the Celtic god Belenus or Abelio was celebrated.

See Herodotus, *Hist.* v. 89, viii. 82; Curtius, iv. 7; Hare, *Ancient Greeks* (1836); Bos, *Antiquities of Greece* (1823, p. 31); F. W. H. Myers, *Greek Oracles* (*Hellenica*, pp. 425–492, 1880); Stengel, *Griechischen Sakralalterthümer* (§§ 44–50, 1890); Schömann's work on *Greek Antiquities* (*Religious Antiquities*, French trans. by Galuski, 1887).

Oran (Arab. *Waran*), a seaport of Algeria, stands on the Gulf of Oran, 261 miles by rail W. by S. of Algiers and 130 by sea S. of Cartagena in Spain. It climbs up the foot of a hill, is defended by detached forts, has a thoroughly French appearance, having been mainly built since 1790, when the older Spanish town was destroyed by an earthquake, and possesses a Roman Catholic cathedral (1839), a grand mosque, a large military hospital, a college, a seminary, and two citadels or castles. The harbour is protected on the north and east by moles constructed in 1887 at a cost of £280,000; alfa, iron ore, and cereals are the chief of the exports. Pop. (1886) 67,681. Oran was built by the Moors. During the second half of the 15th century it was a highly-prosperous commercial town, and was celebrated for its cloth and arms and fine public buildings. But it was taken by the Spaniards in 1509 and made a penal settlement. It was captured by the Turks in 1708, but retaken by the Spaniards in 1732. In 1790 it was destroyed by an earthquake, and shortly after was altogether abandoned by the Spaniards, the Turks occupying it again in 1792. The French took possession of the town in 1831.—The *province* of Oran has an area of 33,236 sq. m., and a pop. (1886) of 756,585, of whom 74,810 were French, 91,494 Spaniards, and 15,771 Jews.

Orang, or ORANG-OUTANG (*Simia satyrus*), an anthropoid ape, found only in the forests of Sumatra and Borneo. There is only one species, though it has been said that another smaller variety occurs in Borneo. The orang is distinguished from other anthropoid apes by its reddish-brown colour; and it has been noticed that the colour corresponds to that of its human neighbours, just as the black colour of the chimpanzee and gorilla answers to

Orang-outang (*Simia satyrus*).

that of the African tribes inhabiting the same country. Miklucho-Maklay asserts that the Malays never use their words *Orang útan* ('man of the woods') for any ape, but for an uncultured tribe of Malays living in the woods.

Like other anthropoids the orang is arboreal in

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habit, and can move with considerable swiftness through a forest, passing from tree to tree; on the ground it is awkward. It has a curious habit of building among the branches a temporary hut or nest as it is usually called. The orang was formerly regarded as capable of all manner of iniquities, such as carrying off women and children, and throttling people with its hind-foot as they passed under the trees. When these beliefs were proved to be false they were transferred to the chimpanzee, and particularly to the gorilla. They were mainly dispelled by Wallace, who stated, however, of the orang that 'there is no animal in the jungle so strong as he;' but strength does not necessarily imply ferocity, and the orang seems to be a very tamable creature.

Hornaday, an American traveller, observed the orang in the act of making its nest. He thus describes the process: 'I got there just in time to see the orang build a large nest for himself. He took up a position in a fork which was well screened by the foliage, and began to break off small branches and pile them loosely in the crotch. There was no attempt at weaving, nor even regularity in anything. He reached out his long, hairy arm, snapped off the leafy branches with a practised hand, and laid them down with the broken ends sticking out. He presently got on the pile with his feet, and standing there to weight it down, he turned slowly, breaking branches all the while and laying them across the pile in front of him until he had built quite a large nest. When he had finished he lay down upon it, and was so effectually screened from us that I could not dislodge him, and after two or three shots I told the natives that they would have to cut down the tree.' During one day's travel in Borneo thirty-six old nests and six fresh ones were seen; there appears to be nothing like house-building, which has been stated by some to exist among the orangs.

The structure of the orang shows its near relationship to the other anthropoids and to man. The curvature of the spine, which is an important character, appears, according to Cunningham, to be different from that of a full-grown man, but to correspond to that of a boy of six years old. The extension of the cerebral hemispheres in the brain backwards over the cerebellum is about equal to what is found in the chimpanzee; naturally this is considerably less than in man, but greater than in the new-born child. The orang comes nearest among the anthropoids to man in certain other characters, especially in brain characters; but, as the gorilla and chimpanzee show a nearer approximation in various other points, it would not be safe to call the orang the most man-like of apes. See ANTHROPOID APES.

Orange (Lat. *aurantium;* from *aurum*, 'gold'), the name of one or more species of Citrus (q.v.), of which the fruit is much prized. Botanists generally regard all the oranges as of one species, *Citrus aurantium*, but some make the Sweet Orange, the Bitter Orange, the Bergamot Orange, &c. distinct species. The wild state of the orange is not certainly known, although its characters may be pretty confidently inferred from the degeneration of cultivated varieties; and no cultivated plant shows a greater liability to degenerate, so that seedling oranges are almost always worthless. From a remote antiquity it has been cultivated in India; and thence it seems to have spread into western Asia and Europe. It has been alleged that the orange is a native of North America, near the Gulf of Mexico; but the probability rather seems to be that it has been introduced, and has become naturalised.

The Common Orange, or Sweet Orange (*Citrus aurantium*), is an evergreen tree of moderate size, with greenish-brown bark; the leaves oblong, acute, sometimes minutely serrated, the leaf-stalks more or less winged, the flowers white, the fruit roundish, the oil-cysts of the rind convex, the juice sweet and acid. It is cultivated in almost every part of the world of which the climate is warm enough, but succeeds best in the warmer temperate or subtropical climates, as in the south of Europe, where it is very extensively cultivated, as far north as the south of France. The orange does not seem to have been cultivated by the Greeks or Romans, but was probably brought to Europe by the Moors, and is supposed to have been introduced into Italy so recently as the 14th century, fully 1000 years after the citron. In the north of Italy oranges are sometimes grown in conservatories, but often in the open air, except during winter, when they are covered with temporary houses of boards. In the south of England they are sometimes in like manner grown in the open air, with a shelter of boards or matting in winter, but trained against a south wall; they attain a large size, and yield good fruit. The abundant importation of the fruit, however, renders the cultivation of the orange in Britain unnecessary; and, in general, only small plants are to be seen in greenhouses or conservatories, as mere objects of interest. In some parts of Queensland and south-west Australia the orange is grown to great perfection, but its culture does not appear to be regarded as a profitable industry—probably owing to the absence of markets and the facilities of conveyance thereto. A few counties in the colony of New South Wales appear to be particularly well adapted to orange cultivation. A government report on the area under orangeries gives it as 10,857 acres in 1889. Excellent oranges have been exported from the colony to Britain at remunerative rates. There are many varieties in cultivation, which are perpetuated by grafting upon seedling orange stocks and by layers. The principal orange-growing sections of the United States are Florida, Louisiana, and California.

Sweet Orange (*Citrus aurantium*), Branch in Flower:
a, fruit; *b*, transverse section of same. (Bently and Trimen.)

Of the varieties of the sweet orange perhaps the most deserving of notice are the Portugal or Lisbon Orange, the most common of all, having the fruit generally round or nearly so, and a thick rind; the China Orange, said to have been brought by the Portuguese from China, and now much cultivated in the south of Europe, having a smooth thin rind and very abundant juice; the Maltese or Blood Orange, remarkable for the blood-red colour of its pulp; the Egg Orange, having fruit of an oval shape; the Mandarin Orange, or Clove Orange (*C. nobilis*), has fruit much broader than long, with a rind very loosely attached to the flesh, and small leaves; and the Tangerine Orange, apparently derived from the Mandarin. The St Michael's

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Orange appears to be a sub-variety of the China orange. The Majorca Orange is seedless. The Kum-quat (*C. japonica*) is a very small tree, with fruit as large as a gooseberry: a native of China and Japan, it has been introduced into Australia.

The Bitter Orange, Seville Orange, or Bigarade (*C. vulgaris*, or *C. bigaradia*), is distinguished from the sweet orange by the more truly elliptical leaves, the acid and bitter juice of the fruit, and the concave oil-cysts of its rind. Its branches are also spiny, which is rarely the case with the sweet orange. The varieties in cultivation are numerous. The bitter orange was extensively cultivated by the Moors in Spain, probably for medicinal purposes, as stomachic and tonic. Its chief use, however, is for flavouring puddings, cakes, &c., and for making marmalade. The Bergamot Orange (*C. Bergamia*) is noticed in a separate article.

Orange-leaves are feebly bitter, and contain a fragrant volatile oil, which is obtained by distilling them with water, and is known in the shops as *Essence de Petit Grain*. Orange-flowers yield, when distilled with water, a fragant volatile oil, called *Oil of Neroli*, which is used in making *Eau de Cologne* and for other purposes of perfumery. The flowers both of the sweet orange and of the bitter orange yield it, but those of the bitter orange are preferred. Dried orange-flowers, to be distilled for this oil, are an article of export from the south of Europe. They are packed in barrels, and mixed with salt. The dried flowers have a yellowish colour; the fresh flowers are white and very fragrant. The use of them as an ornament in the head-dress of brides is common throughout great part of the world. The small green oranges, from the size of a pea to the size of a cherry, which fall from the trees, both of the sweet orange and the bitter orange, when the crop is too great to be brought to maturity, are carefully gathered and dried, and are the *Orange berries* of the shops. They are used in making Curaçoa, and yield a fragrant oil on distillation, the original *essence de petit grain*. The dried and candied rind of the ripe bitter orange, well known as *Orange-peel*, is used as a stomachic, and very largely for flavouring puddings and articles of confectionery. The rind of the sweet orange is sometimes employed in the same way, but is inferior. A fragrant essential oil is obtained from the rind of the orange by distillation with water, and is sold by perfumers as *Oil of Sweet Orange*, or *Oil of Bitter Orange*, according as it is obtained from the one or the other, although the two kinds of oil are very similar. The rind of the orange is used in the preparation of a fine liqueur called *Orange Rosoglio*, which is an article of export from some parts of Italy. Besides the use of the sweet orange as a dessert fruit, and as a refrigerant in cases of sickness, its juice is extensively used as a refrigerant beverage, and is valuable in febrile and inflammatory complaints.

Orange-trees are often extremely fruitful, so that a tree 20 feet high and occupying a space of little more than 12 feet in diameter sometimes yields from 3000 to 4000 oranges in a year. One tree in Florida has often borne 10,000 oranges in a single season. The orange-tree attains an age of at least 100 to 150 years. Young trees are less productive than old ones, and the fruit is also less juicy, has a thicker rind, and more numerous seeds.

The fruit of the orange-tree is of great commercial importance, for not only is it one of the most delicious and wholesome of fruits, but fortunately it is also the most easily kept and carried from place to place. No fresh fruit possesses in the same degree as the orange and its congeners, the lemon, citron, lime, &c., the property of being easily packed in boxes when nearly ripe, and being in that state able to stand the close confinement of a ship's hold during a voyage of two or three weeks. The orange is much cultivated in the Azores, Malta, Sicily, Spain, Portugal, the Syrian coast, and latterly in Florida, and it is from these localities that Britain receives its supply. Those from St Michael's, one of the Azores, and from Malta are the best varieties in the English markets; but the Mandarin Orange of China and the Navel Orange of South America are much superior. The latter occasionally reach Britain in small quantities from Brazil; they are nearly double the size of the ordinary orange, and have a peculiar navel-like formation on the top of the fruit, which is somewhat oval in shape.

Oranges when gathered for export must not be quite ripe; those fully formed and with the colour just turning from green to yellow are chosen. Each is wrapped in a piece of paper, or in the husk of Indian corn, and they are packed in boxes and half-boxes, chests and half-chests—the former are the Sicilian packages, the latter are St Michael's, Spanish, and Portuguese. A box contains about 250, a chest about 1000 oranges.

Orange-peel, or the rind of the orange, is used both in medicine and in confectionery—for the former purpose it is merely cut into long strips, and dried; for the latter it is carefully separated, either in halves or quarters, from the fruit, and, after lying in salt water for a time, is washed in clear water, and then boiled in syrup of sugar, or candied, and is sold extensively as candied peel. The rinds of the citron and lemon are treated in the same manner.—The wood of the orange-tree is yellowish white and close-grained. It is used for inlaying and for turnery.

The orange may be successfully cultivated in climates the winter temperature of which does not fall below 40°. The tree prefers strong loam or clayey soil, but succeeds in any kind of soil if well fertilised. See Dr Moore's *Handbook of Orange Culture* (New York and Lond. 1885); and United States Consular Report on *Fruit Culture* (1890).

Orange, or GARIEP, the largest river of South Africa, rises in the Kathlamba Mountains, in the east of Basutoland, and flows west, with an inclination to the north, to the Atlantic Ocean. It describes numerous wide curves in its course of 1000 miles, and separates Cape Colony, on the south, from the Orange Free State, Griqualand West, Bechuanaland, and Great Namaqualand, on the north. Area of basin, 325,000 sq. m. Its principal tributaries are the Caledon and the Vaal, both joining it from the right. Its volume varies greatly between the dry season, when it is not navigable, and the rainy season, when it overflows its banks in the upper parts of its course. Its mouth is, moreover, obstructed by a bar.

Orange, a town in the French department of Vaucluse, on the left bank of the Aigue, 18 miles by rail N. of Avignon. The *Arausio* of the Romans, which contained 40,000 inhabitants, it retains two splendid Roman remains—a triumphal arch, 72 feet high, and a theatre whose façade was 340 feet long by 118 high. A neighbouring circus has been swept away. There is a Romanesque cathedral, and statues of two of the counts. Pop. 6904.

Orange was the capital of a small independent principality, which was ruled by its own sovereigns from the 11th to the 16th century. The last of these sovereigns, Philibert de Chalons, died in 1531 without issue. His sister, however, had married a Count of Nassau, and to that house the estates and titles passed. The Count of Nassau who obtained the principality of Orange was the father of William the Silent (see HOLLAND, Vol. V. p. 742). William

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III., Prince of Orange and king of England, having died in 1702 without issue, there began a long-continued controversy as to the succession between Frederick I. of Prussia (as grandson of one of the last princes of Orange), the representative of the older branch of the House of Nassau (q.v.), and the head of the younger line. At the peace of Utrecht (1713) the king of Prussia took the settlement into his own hands, so far as the territory of Orange was concerned, by making it over for certain equivalents to the king of France. The title Prince of Orange, however, remained with the younger Nassau line, afterwards sovereigns of Holland. See Bastet's *Histoire d'Orange* (1856).

Orange, a city of New Jersey, 12 miles W. of New York by rail, and 3 miles by tram-car from Newark. The slope of Orange Mountain is laid out in beautiful parks, and ornamented with villas. There are manufactures of hats, carriages, &c. Pop. (1880) 13,207; (1890) 18,884.

Orangemen, an association of Protestants to support and defend the Protestant succession to the British throne and the Protestant religion in Church and State, as settled by the Bill of Rights and Act of Settlement of 1688. It had its origin in William, Prince of Orange—hence its name—on his arrival in England to accept the crown. The first declaration of its objects and principles was drawn up in November 1688 at Exeter by the prince's chaplain, the famous Dr Burnet, at the suggestion of Sir Edward Seymour, and subscribed by the leaders who had invited the prince to England—pledging themselves 'to stand by the Prince and one another,' and to 'persevere until the liberties and religion of England should be effectually secured.' This declaration was in force till 24th February 1696, when a scheme for the invasion of England by James, helped by France, was revealed to both houses of parliament. This led to a second declaration of the association, which was signed by 420 members of the House of Commons, by 83 peers, by the corporation of London, and other municipalities and counties in England, and thus 'four-fifths of the nation were combined in one vast club.' It was also signed by every member of the Irish House of Commons except one. After the death of William the association remained quiescent till the reign of George III., when in 1795 it was vigorously revived in consequence of the discovery of treasonable societies in England and an approaching rebellion in Ireland. It has existed ever since. It cherishes the memory of William and holds anniversaries of the principal struggles in Ireland, such as the siege of Londonderry, the battles of the Boyne (1st July) and Aughrim (12th July), and the day of the landing of William at Torbay (5th November). The structure of the organisation is similar to that of freemasonry, although not a secret society. In consequence of the tactics of its opponents it has been most prominent in Ireland, but wherever ultramontane principles are propagated within the British dominions the Orange Society exists, as in Canada and Australia. Its membership is more than half a million. Its objects are carried out by lodges, individual or private, district, county, or provincial and national—all united by one grand lodge in each country. Every lodge is opened by prayer and reading a portion of Scripture. Each member must be a Protestant, and pledges himself to maintain its principles. A lodge is guided by a master, secretary, treasurer, and other office-bearers. The grand lodge is representative, and is held usually every twelve months, although power is given to summon it in any case of emergency. There is also an imperial grand council, composed of delegates from the grand lodge of every country within the British dominions. It meets every three years in the country which is selected from time to time. This council is guided by an imperial grand-master. Attempts have been made in the British parliament to break up the organisation and to declare it illegal, but its laws and ordinances are in compliance with the statutes of the imperial parliament. In 1890 the Canadian parliament passed, after much opposition by the ultramontanes, an Act of Incorporation of the Grand Lodge of British America.

See Burnet's History; Boyer, Kennett, Harris, Rapin, Ralph, Dalrymple, Trevor, Macaulay, Torriano, and the laws and ordinances of grand lodges.

Orange River Free State, a republic of Dutch Boers in South Africa, lying between the Vaal and Orange rivers, on the north and south respectively, and between Griqualand West and the Drakenberg Mountains on the east. This region is a plateau, rising from 3000 to 5000 feet above the sea-level, with very little wood, except alongside the numerous watercourses that traverse it. Its vast undulating plains slope down to the Vaal and the Orange, and are dotted over with isolated hills called 'Kopjies'—magnificent pasture-land. Area, estimated at 41,500 sq. m.; pop. (1880) 133,518; (1890) 207,503—77,716 being whites. When the Dutch Boers left the Cape Colony (1836) and took possession of this country it was inhabited by Bushmen, Bechuanas, and Korannas. Pastoral pursuits predominate—the rearing of merino sheep, cattle, horses, goats, and ostriches. Corn (wheat, maize, Kaffir corn) is grown, chiefly in the east. Coal is mined in the north and diamonds in the south-west, towards Kimberley. The climate is healthy and temperate. The country is governed by a president, elected by the people for five years; an Executive Council, consisting of the president and two official and three unofficial members; and the Legislative Council of fifty-seven members, elected by all adult white males. The state is financially in a flourishing condition. In case of necessity all able-bodied citizens are liable to be called upon for its defence; there are no fortifications, and by way of a standing army one battery of artillery worked by less than sixty men. A railway line is being built from the Orange River to Bloemfontein (q.v.), the capital. Commerce, exports (wool, diamonds, hides, ostrich-feathers, and live animals) and imports, passes through the ports of Cape Colony and Natal, and reaches an estimated total of 3 millions sterling. Education stands at a fairly high level amongst the whites; the prevailing religion is the Dutch Reformed. The Cape government appointed a resident in the republic in 1845, and three years later it was annexed to the British crown as the Orange River Sovereignty; but in 1854 it was given up to the Boers, who formed themselves into the independent republic of the Orange River Free State.

See Norris-Newman, *With the Boers in the Transvaal and Orange Free State* (1882); Anthony Trollope, *South Africa* (2 vols. 1878); E. de Weber, *Quatre Ans aux Pays des Boers* (1882); and Theal's *History of the Boers in Southern Africa* (1887).

Oratorio (*Dramma sacra per la Musica*), a sacred story set to music, which, as in the opera, requires soloists, chorus, and full orchestra for its performance, the theatrical adjuncts, however, of scenery, costumes, and acting being dispensed with. It receives its name from the oratorio or oratory of the church of Santa Maria Maggiore, near Rome, where St Philip Neri arranged musical performances (1571–94), which developed into the modern oratorio. These performances were prompted by the same spirit which had in the miracle and mystery plays of the middle ages sought to interest and educate the unlearned.

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The effort to find a more dramatic vehicle of expression which had proved in Florence the germ of Opera (q.v.) was also being made in Rome by Emilio del Cavaliere. And by a curious coincidence the first oratorio and the first opera (properly so called) were produced in the same year (1600) in these two cities. Cavaliere's oratorio, which was written throughout in recitative style, was called *La Rappresentazione del' Anima e del Corpo*, and the directions for acting, dressing, and dancing, as well as singing, show how entirely the conception of oratorio has changed since its first rude beginning. During the 17th century Carissimi and Scarlatti wrote many works full of expression, but the Italians were, as a rule, more engrossed with the development of opera. Indeed, save in such expressive works as Carissimi's *Jephtha*, Stradella's *John the Baptist*, and the like, there is no difference between opera and oratorio composition, and it was among the graver nations of the North that the oratorio was to arrive at its maturity. There the first and almost universal subject was the Passion; and to illustrate the story and direct the meditations of the devout, Schütz, Graun, Handel, and Bach employed all their skill in musical construction, and all the resources which counterpoint, harmony, and orchestration could afford them. Solid part-writing for voices is absolutely necessary for such impressive and serious works as oratorios, and it is the neglect among the Italians of the art they had brought to such perfection during the 16th century which has caused the crown to pass from Italy to Germany. The greatest 'Passion Music' is the *St Matthew*, written for service on Good Friday, 1729, by Seb. Bach. It contains choruses, solos, and chorales (in which the congregation took part), all of surpassing interest and beauty, and showing when requisite great dramatic truth and force. And as this work is the climax, so it is the close of passion music development.

The next and most important phase of oratorio was the *Epic*, which became in Handel's giant hands such a powerful instrument. Before he wrote *Saul* and *Israel in Egypt* (1739) he had written an early oratorio in the Italian, and Passions, &c. in the German style. Between his arrival in England (1710) and his abandonment of the opera he had in no fewer than forty-four operas accustomed himself to all the possibilities of vocal expression; and his Italian training, his studies in Germany, and his varied experience eminently fitted him for his task. In twelve years he composed fifteen grand oratorios (*Israel in Egypt*, *Messiah*, *Samson*, *Judas Maccabæus*, *Joshua*, *Solomon*, *Jephtha*, &c.), besides several cantatas and anthems of almost oratorio dimensions. The greatest is *Israel in Egypt*, with its massive double chorus-writing and its grand effects; but the *Messiah* is a work which stands out not only among oratorios, but in all musical literature as a great inspiration. Pure inspiration it must indeed have been, for it was written in twenty-four days! The great admiration for Handel's compositions in England finds expression every three years in the Handel Festival, held in London, at which the *Messiah*, *Israel in Egypt*, and a 'selection' are performed on a gigantic scale (about three thousand singers and five hundred instrumentalists).

Haydn heard Handel's works when he visited England in 1791–92, and was incited to the composition of his great oratorio, the *Creation* (and also the charming pastoral the *Seasons*, which should scarcely be called an oratorio); in fact, Handel has been the inspiration and model of nearly all succeeding oratorios, as England, his adopted country, has been oratorio's peculiar home. There the unequalled choruses and the general custom of choral festivals on a large scale offer numerous opportunities for producing familiar masterpieces and inducements to compose new works. For the Birmingham Festival of 1846 Mendelssohn wrote his masterpiece, the *Elijah*, a work of great originality, which, however, owes more to the influence of Bach than of Handel. *St Paul* was produced at Düsseldorf ten years earlier.

Daring orchestral colour and original effects characterise Spohr's oratorios, *Last Judgment* (1826), *Calvary* (1835), and *The Fall of Babylon* (1842). Modern oratorios take advantage of the dramatic element which is so strong in the music of the 19th century, and in many works the name is modified (e.g. Dramatic Oratorio—Mackenzie's *Rose of Sharon*, Parry's *Judith*, &c.) or avoided (Sacred Trilogy—Gounod's *Redemption*, Berlioz's *Childhood of Christ*, &c.). Dvorák's *St Ludmila* and Liszt's *St Elizabeth* and *Christus* lean more and more to the form of dramatic cantata, of which Beethoven's *Mount of Olives* (miscalled an oratorio), Schumann's *Paradise and the Peri*, Sullivan's *Golden Legend*, and Mackenzie's *Dream of Jubal* and *Sayid* are fine examples.

To treat of the large field thus opened to modern composers in the dramatic cantata, sacred and secular, would lead us far beyond the limits of this article; reference must be made to musical dictionaries, as well as, more strictly for Oratorio, to Bitter's *Geschichte des Oratoriums* (1872), Wangemann's *Geschichte des Oratoriums* (1882), Rockstro's careful article in Grove's *Dictionary*, and Upton's *Standard Oratorios* (Chicago, 1887).

Oratory of St Philip Neri, CONGREGATION OF THE. The origin of the Congregation of the Oratory has been described in the article on St Philip Neri, its founder (see NERI). Here something must be said of its constitution and work. The primary idea of the institution was that its members should be bound by no religious vows. They were to be secular priests living together under a common rule, and practising obedience as free subjects, with liberty to quit the community if they so willed. Each father must contribute an annual pension towards the upkeep of the house, and have, moreover, a sufficiency of private means for his personal expenses. Otherwise he has absolute control over his own property. The government of the congregation is of a remarkably republican character. Each community is entirely independent, being subject to no mother-house or general-superior. The community is composed of three classes—the novices, triennial and decennial fathers. A member after passing his novitiate becomes a triennial father, with a consultative voice in the affairs of the congregation. On the completion of his tenth year he becomes a decennial father, with a decisive vote. The superior, who is generally spoken of as 'the Father,' is elected every three years, and with him are elected four deputies, who form a committee which meets weekly, has the appointment of the other officers, distributes the ecclesiastical work, and controls the ordinary expenditure. But no large expenditure or new undertaking can be entered upon without the consent of the general congregation, where in all cases the voting is by ballot. The father superior, *primus inter pares*, has no privileges and is exempt from no rules. He takes his turn in the waiting at table in the refectory, and has his share in the work of the church. The principal religious exercise of the community, beyond the duties common to all priests, is half-an-hour's mental prayer in the evening followed by the litanies, for which three times a week is substituted the taking of 'the discipline' or self-flagellation in a darkened room. The ceremonial for this exercise will be found described in Hone's *Ancient Mysteries*. The ministerial work of the Oratory consists chiefly in

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constant attendance in the confessional and in the characteristic daily preaching. Another essential part of the institute is an external brotherhood similar in some respects to the 'Third Orders' of the older religious orders, but consisting of men only, who meet in a separate chapel called the Little Oratory, under the direction of a father prefect. The brothers, as a rule, observe the same exercises as the fathers. It is in the Little Oratory that the musical services which originated the oratorio are held. Music was so often performed in the oratory at Seville that Blanco White speaks of it as the 'spiritual opera-house.' Philip Neri, who governed the community at Rome as long as he lived, committed no rule to writing. The traditional rules drawn up at a later time were approved by Paul V. in 1612.

The Oratory spread rapidly through the chief cities of Italy, and there were several houses in Spain. In Germany it never took root. In France Cardinal de Bérulle took the institute as his model in a new foundation (1611), approved by Paul V. in 1614, under the name of the 'Congregation of the Oratory of our Lord Jesus Christ in France.' But it differs essentially from the Oratory of St Philip Neri. It was governed by a superior-general, and was mainly concerned with the institution of seminaries for the training of priests.

The life in the Roman Oratory admitted leisure for private study; and the founder, in encouraging Cesare Baronio to write his great work on church history, set an example which was followed by many distinguished scholars—Bozio, Gallonio, Aringhi (*Roma subterranea*), Bianchini (*Evangelium quadruplex*), Gallandi (*Bibliotheca patrum*), and others. It was natural that the character of Philip Neri and the community life which he established should have a particular attraction to a number of men from the English universities, who were led by the Oxford movement to the Church of Rome. Dr Newman when at Rome obtained from the pope a brief (26th November 1847) authorising him to establish the Oratory in England. Shortly afterwards F. W. Faber, who had founded a new order, 'the Brothers of the Will of God,' generally known as 'Wilfridians,' joined, with his whole community, the Oratory at Birmingham. In 1849 Father Faber was sent to London with some other fathers to set up a house in King William Street, Strand, which in October 1850 was constituted an independent congregation, and in 1854 was transferred to its present abode in Brompton.

There seems to have been a project of introducing the Oratory into England in the reign of James II., and there is in the British Museum an extremely rare if not unique copy of an English translation of the Rule printed in 1687.

The early history of the Oratory was written in 5 vols. folio by Marciano, *Memorie Storiche*, &c. (1693–1702). Compare *Newman e la Religione Cattolica in Inghilterra, ovvero l'Oratorio Inglese*, by Capecelatro (Naples, 1859), and *Life and Letters of F. W. Faber*, by J. Bowden (1869). The *Instituta Congregationis Anglicæ* was printed in Rome at the Propaganda Press in 1847.

Orbis Pictus. See COMENIUS.

Orbit, in Astronomy, is the path described in space by a heavenly body in its revolution round its primary. The path so described is of an elliptic form, and would be accurately an ellipse were it not for the disturbing influence of the other heavenly bodies (see PERTURBATIONS). The complete determination of a planet's orbit is of the last importance to astronomers, as it enables them to predict the planet's place in the heavens at any period, and thus determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets, and of the appearances and disappearances of comets. For the determination of a planet's orbit it is necessary to know three things: (1) The situation of the *plane* of the orbit in space; (2) the position of the orbit in this plane; and (3) the situation at a given epoch, and rate of motion, of the planet in its orbit. Since the plane of the ecliptic is for convenience taken as the reference plane, the position of the plane of a planet's orbit is known when (1) its inclination to the plane of the ecliptic and (2) the line of intersection of the two planes are known.

Orcagna, whose real name was *Andrea di Cione* and his nickname ARCAGNUOLO ('archangel'), corrupted into Orcagna, was a painter, sculptor, and architect, as well as a maker of poems. Born, about 1316, the son of a Florentine worker in silver, he was early imbued with artistic tastes. Sculpture he learned in the studio of Andrea Pisano, and in painting was helped by an elder brother. In 1355 he was appointed architect to the church of Or San Michele in his native city; his greatest artistic triumph exists in the marble tabernacle in this church. 'This, in its combined splendour of architectural design, sculptured reliefs and statuettes, and mosaic enrichments, is one of the most important and beautiful works of art which even rich Italy possesses. It combines an altar, a shrine, a reredos, and a baldacchino' (Middleton). From 1358 to 1360 he was chief architect of the cathedral at Orvieto, for which he designed some mosaic pictures. In Florence he planned a mint, piers in the cathedral, and other works. His earliest achievement with the painter's brush was to execute, in conjunction with his elder brother Nardo, several frescoes in the church of Santa Maria Novella at Florence. Some of these have perished; but a 'Last Judgment' and 'Christ and the Virgin enthroned in Heaven' still survive, though greatly restored. Other frescoes in the cemetery at Pisa that were attributed to Orcagna are now believed to have been by a painter or painters of the Sienese school. Orcagna painted several panel pictures, including a retable for the altar in the Strozzi chapel of Santa Maria Novella; another for the church of San Pietro Maggiore in Florence, now in the National Gallery, London; an altarpiece in the chapel of the Medici (Santa Croce), Florence; and 'St Zenobius Enthroned,' in the cathedral of Florence. Orcagna's death is usually given as 1389; but 1376 seems a more likely date, or even 1368. See the article by Professor J. H. Middleton in *Ency. Brit.*; and Crowe and Cavalcaselle, *Painting in Italy*, vol. i. (1864).

Orchard (generally supposed to be from A.S. *ort-geardе*—i.e. a yard or enclosure for orts, worts, or wurts = Lat. *olus*, but strangely resembling the Gr. *orchatos*, especially in the Miltonic form, *orchat*) is a space of ground employed for the growth of hardy tree-fruit, such as apples, cherries, pears, and plums. By common usage and the force of climate the word in Great Britain has now become suggestive of apples only; and if the fruit be of any other staple a special prefix is generally employed, except in the counties (and few they are) in which cherries, pears, or plums are grown thus largely, such as Kent, Hereford, and Worcester. In some parts of the United States peaches are grown in vast quantities upon orchard-trees, and that fruit can be ripened thus in the southern counties of England, when the spring and summer have been favourable. But in the main with us the orchard is a plot of ground planted with apple-trees, and thus we shall chiefly regard it.

In England, as well as the more fruitful parts of Scotland, the manor-house, vicarage, manse, or farm, or other well-environed dwelling-place, has its own orchard not far from the house, and capable of producing fruit, unless too much discouraged.

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Too often the orchard is treated with contempt, as a space where the children, turkeys, calves, or pigs may roam at pleasure; and if there are any apples they are regarded as a windfall of some rarity. This is not as it ought to be. Orchards were laid out at a time when there was room enough to move freely, and people knew less than they seem to know now. Accordingly we find on these old trees either no fruit at all, or very little, and of that the chief part worthless. There is no greater puzzle to the farmer or squire farming his own land than the sad condition of his orchard and his own deep ignorance about it. Amid the more important works the trees have too often been neglected; and the space which should yield its fair share of profit, as well as of picturesque enjoyment, has become a frowsy wilderness.

Much of the blame for this would fall on those who are now beyond it. Seldom indeed can we find an orchard planted by our ancestors with any common sense or judgment. The trees have been placed there anyhow, without any knowledge of their habit, growth, fertility, use, or requirements. And for this the nurserymen of that time must also be held accountable, their ignorance of their own produce having been equal to that of their customers. In this particular a vast advance has been made in the last half-century, and the planter of an orchard now has himself to thank if he plants amiss. For of late years it has been imagined largely that profit, equally speedy and heavy, can be secured very pleasantly by the growth of fruit in Britain. In spite of all experience this may be so, as we find the laws of nature overcome now and then by superhuman effort. And when everything comes to pass exactly as it should, the orchard takes occasion sometimes to pay its way. With a view towards this we may consider first the formation and planting of an orchard; secondly, the renewal of an old and not too hale plantation.

(1) Situation and soil are the first two questions, the former being even the more important in the colder parts of Britain. A slope towards the south or south-east is best of all; but if that cannot be found a fair level will do, unless it be in the bottom of a valley or too near some broad river. A damp situation is always bad; and especially evil is the spot—though it may be the warmest in summer—where the fog of the morning draws and packs from the marshes or from a tidal river. For the worst of all enemies to British fruit is the late spring frost, which settles chiefly in the valley or along the plain; whence the bleak hillside is often fruitful when the sheltered dale is barren. Also the soil must be fairly good, neither too sandy nor of very heavy clay. When the site has been chosen the ground should be trenched to the depth of two feet if possible, and drainage provided where needful, as in all but the most favoured spots it is. Time for settlement should be allowed after the trenching; and then the stations may be prepared for the standard-trees. The distance from tree to tree and row to row ought to be governed by the choice of kinds, and this again depends upon the object of the planter. He may plant for home use, or for sale, or for both; and in either case for table use or for cider. If he plants for his own table use—be it for cooking or dessert—his chief concern is quality combined with fair fertility. If he plants for market he must first consider productiveness and appearance and the common opinion of his neighbourhood; for if he took into the market the best apple ever grown, but as yet of no reputation, he would have to take it home again until the trees grew old. Also, he would rather sell good fruit than bad; but generally speaking this is difficult without much self-sacrifice. For the finer kinds are, with few exceptions, less fertile than the inferior. But whatever his objects be, and whatever varieties he selects, the planter must be guided by the habit of the trees as to the space allowed them. It is better to allow too much room than too little; and in a plantation intended to endure, 25 feet from tree to tree is not one too many. The permanent trees should be straight standards, worked upon the crab-stock, and with 6 feet of stem from the root to the spread of the branches. Let them be planted almost upon the surface, then banked up with good soil, and staked securely, until they can hold their own against the wind. Of pruning little or none is required during the first year of their growth, except that any weak shoot should be cut out, or rival to the leader repressed at once, if the tree is to be carried up in conical form. No manure should be given as yet, unless it be in the way of mulching, where the soil is very droughty. When all the standards are planted and staked, and seen to 'cut true,' as gardeners term it, both along and across the rows, the temporary crop may be planted among them, whether of dwarf-trees, or of bushes, vegetables, clover, or anything else; but a clear space must be reserved at all times of at least a yard around the orchard-tree. And throughout the next year the young plantation must be heeded frequently, disfruited (if any rash produce form), watered in case of protracted drought, restaked or rebound if any break loose, and watched that no grub or other vermin bore the slender stem, or injure bark, branch, or foliage. In the second year judicious pruning will be needed, for which see our article on that subject. The ground between the trees may be cropped with grass or clover (not allowed to become too long), which can be broken up for the purpose of manuring, and at other times saves the dropping fruit from bruises. With regard to varieties it is quite impossible to offer useful advice without a knowledge of each special case. If the planter is providing for his own household he generally knows what suits it best and befits the situation. If he grows for market he can have recourse to the counsel of some good nurseryman acquainted with the neighbourhood, its wants and suitabilities; he will probably find his trees true to name, clean, well grown and healthy; for in no line of business has there been more advance during the last half-century than in that of the nurseryman.

(2) With regard to the renewal of an ancient fruit-grove or the way to make the best of it, any one coming into possession or management of a decrepit orchard may wisely allow one fruiting season to show what good there is in it. All trees of valuable kind may then be marked for better cultivation, while the rest are divided into those worth grafting and those that are worthy of the domestic hearth; and the last will perhaps be more numerous. The trees that have goodness or beauty of fruit, with vigour sufficient to carry it, should at once be relieved of all moss and decay, straggling or worn-out or ill-placed members, or thickety growth of feeble wood, and perhaps in some places be cut back with discretion. Then the ground should be opened around the trunk, with tender avoidance of all upper roots (if any still live as a rarity), and a mulching of good, rich manure should be laid on in the winter-time; or, failing such encouragement, a frequent supply of good liquid strength, when the roots are on the feed in summer-time. The difficulty is to get this new supply to the parts that are fit to take it up, and then to provide the proper dose. And none but a man who knows the nature of a tree should be permitted to attempt it. Too often the roots of these old trees are prongs that strike downwards mightily, in the manner of a well-

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grown carrot, leaving nothing with a mouth for better feeding reasonably near the surface. Little improvement must be looked for during the first season, but even then there should be symptoms of increasing vigour, and in the second year the tree should be making healthy growth again.

Those that are of inferior kind, but have kindly wood for grafting, should be headed back or shortened home, with the dry and ragged wood removed. Then in the spring let fair stout scions of the better sort be inserted, chosen from strong growers, such as impart their own vigour to the stock; for it is vain to work a feeble kind upon a long-established tree. The result will sometimes be a great success and sometimes downright failure, according to the harmony of stock and graft, upon which point the most experienced gardener as yet knows very little.

Many old trees, as before suggested, will be fit for nothing but firewood. These should be grubbed up at once, not with a feeble hand, but following every root as if you hated it. Then let a large space be excavated and filled in with abundant fresh soil trodden at every layer, and upon this young standards of vigorous kind must be planted, as shallow as may be, and banked up and staked. None but the strongest and most rapid growers can hope to make good these gaps among the elders, and even so they will be long about it. The virtue of patience must be highly cultivated by the owner of an ancient orchard. Even for renewal of an old plantation little can be said as to choice of sorts without thorough knowledge of locality. Many apples that become a picture in Kent or Surrey or Devonshire are plain little dowdies in Yorkshire, and unsightly scrubs in Scotland; while others that are comely and good in the north are vapid in the southern counties. Again, few or none of the American kinds, so handsome and fine when imported, can be grown to perfection in Great Britain. The conferences of the Royal Horticultural Society have afforded most valuable hints upon this subject, and their report should be studied with care. Much may also be learned from recent treatises by pomologists, such as Dr Hogg's *Fruit Manual;* John Scott's *Orchardist;* the works of the late Thomas Rivers, and the fruit-lists of the present T. F. Rivers; the *Growth of Fruit for Profit*, by George Bunyard of Maidstone; and a concise work on the same subject by Mr Wright of the *Horticultural Journal*. See APPLE.

Orchardson, WILLIAM QUILLER, a genre-painter, who is considered to bear the palm in this branch of art, surpassing all other English physiognomists in accuracy, expression, and dexterous execution. He was born in 1835 in Edinburgh, where subsequently he studied under Scott Lauder at the Trustees' Academy; he became A.R.A. in 1868, R.A. in 1877, and received a Medal of Honour at the *Exposition Universelle*, 1878. Best known among his exquisite and highly-popular pictures are 'The Challenge' (1865), 'The Duke's Antechamber' (1869), 'Casus Belli' (1870), 'The Protector' (1871), 'The Bill of Sale' (1875), 'The Queen of the Swords' (1877), 'A Social Eddy' (1878), 'Hard Hit' (1879), 'On board H.M.S. *Bellerophon*, July 23, 1815' (1880; bought by the Chantrey Bequest), 'Mariage de Convenance' (1884), 'After' (1886), 'The Salon of Madame Récamier' (1885), 'The First Cloud' (1887), 'Her Mother's Voice' (1888), and 'The Young Duke' (1889).

Orchestra (Gr., from *orcheomai*, 'I dance'), the part of the old Greek theatre where the chorus danced; in the modern theatre, the part set apart for the band; hence now frequently the band itself, in a theatre or at a concert. For the development of the orchestra in this latter sense, and the partition of instruments in a representative orchestra, see MUSIC, p. 360. See also BAND, THEATRE.

Orchids (ORCHIDEÆ or ORCHIDACEÆ), a natural order of endogenous plants distinguished from all other orders in the same alliance by their irregular gynandrous flowers and parietal placentæ. The essential peculiarities of the order are due to the consolidation of the stamens and pistil into one body called the *column;* to the suppression of all the anthers but one in all the genera except those comprising the tribe Cypripediæ, in which there are two anthers; to a peculiar condition of the pollen and the structure of the anthers containing it, and to the remarkable forms and development generally assumed by the lip (*labellum*)—one of the inner members of the perianth which often plays an important mechanical part in the fertilising of orchids. The species are perennial herbaceous plants or shrubs of terrestrial habit in the temperate and colder parts of the world, but in warmer countries become epiphytal, adhering to the stems and limbs of trees, or fixing themselves on rocks by their strong fasciculate roots without penetrating the structure of these, or having any direct connection with the soil. Hence they have been popularly named air plants, as those which assume the epiphytal habit derive the greater part of their nutriment from the atmosphere. Their roots are fibrous or fasciculate or fleshy and tuber-like, the latter being peculiar to the terrestrial species. Their stems are annual, herbaceous, perennial, and woody, and very often pseudo-bulbous. Their leaves are flat or round, equitant, and generally sheathing, often leathery, and having parallel nerves. The flowers are irregular, extremely variable in form, often beautifully coloured, and deliciously fragrant, and are either solitary or in spikes, racemes, or panicles. They are composed of six usually petal-like segments: the three outer ones are called sepals, and two of the inner ones, which are usually alike in form and colour, are called petals; the third inner one, which differs in shape and also generally in

Fig. 1.—Cypripedium Boxallii.

direction from the others, is the lip. Opposite to the lip in the axis of the flower is the *column*, bearing the anther or anthers with the pistil variously situated relatively to each other. The more obvious features described are well illustrated in the accompanying figures of Cypripedium (see also LADY'S SLIPPER), Mormodes, Odontoglossum, and Oncidium, in which the six segments of the perianth are so conspicuous as to reveal at a glance their structural relation to each other.

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Orchids are found in almost all parts of the world, except in extremely dry climates and on the borders of the frozen regions. In Britain there are found sixteen genera and nearly forty species. In Europe, the temperate parts of Asia, in North America, and the Cape of Good Hope they are common inhabitants of groves, marshes, and meadows; and in these regions they are invariably terrestrial in habit. But in the hot damp parts of the West and East Indies, in Madagascar, and other islands in the same region, in the moist forests of Brazil, the warm parts of Central America, and western Mexico they abound in the greatest profusion, no longer dependent on the soil for their nutriment, but clinging to the trunks and branches of trees, to stones and crags, where they vegetate among ferns and other shade-loving plants, or occupy by themselves exclusively the places which they affect. The family is a very numerous one, there being, according to the *Genera Plantarum*, 334 genera and about 5000 species known to botanists. Of exotic species Linnæus knew only about a dozen a little over a century ago. About 2000 species have been introduced to cultivation. The beauty and the fragrance of the flowers, the singularity and almost endless variety of form which they exhibit, and their interesting structure botanically, along with the rarity of many of the most beautiful, place orchids among the most remarkable of the families of the vegetable kingdom. Darwin, who devoted much attention to the family, particularly in regard to their fertilisation, says of the peculiarity of the structure of the flowers of orchids that 'an examination of their many beautiful contrivances will exalt the whole vegetable kingdom in most persons' estimation,' and that 'hardly any fact has struck him so much as the endless diversities of structure —the prodigality of resources—for gaining the same end, namely, the fertilisation of one flower with pollen from another plant.' This part of the history of orchids is, like every other point connected with them, too wide to be dealt with here in detail. Those, however, who desire to study the matter closely should see the work quoted from —*The Fertilisation of Orchids*, by Charles Darwin.

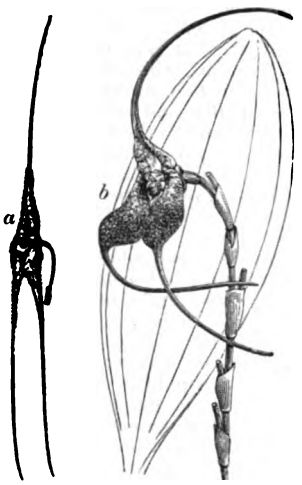

Fig. 2.—*a*, Masdevallia chimæra; *b*, M. Schlimii.

Fig. 3.—Mormodes Ocannæ.

Since the middle of the 19th century the cultivation of orchids in Britain, on the Continent, and in America has become an absorbing pursuit with wealthy amateurs. The possession of a rare or unique species or variety is an ambition that can only be attained by the millionaire; the prices of such are quite beyond the means of those possessed only of moderate wealth. Syndicates are formed for the purpose of collecting and importing orchids from all countries in which rare or otherwise valuable species are known to exist, and private persons and several of the leading London and continental nurserymen send experts in orchid-collecting to those countries at great expense with the same object in view. There is thus considerable commerce in orchids, in connection with which large sums of money are circulated annually. The genera which are in greatest request among amateurs are Cypripedium, Dendrobium, Masdevallia, Odontoglossum, Cattleya, Lælia, Oncidium, Chysis, Cymbidium, Calanthe, Phalænopsis, Cœlogyne, Angræcum, Vanda,

Fig. 4.—Odontoglossum Harryanum.

Angulos, Epidendrum, Sophronitis, Renanthera, Saccolabium, Miltonia, Peristeria, Lycaste, and many others.

Amongst notable English collections have been those of Baron Schroeder at Egham in Surrey, and Sir Trevor Lawrence at Dorking, each of which must have cost its owner from £30,000 to £40,000 to bring together. Among large commercial collections are those of Veitch, Williams, Low, and Bull, all of London, Sander & Co. at St Albans, and in Scotland of Messrs Thomson at Clovenfords. Sales by auction, at which orchids to the value of thousands of pounds may change hands, take place frequently in London, which is the centre for the world of the trade in orchids. The prices of individual plants vary from 3s. 6d. to hundreds of pounds, the prices depending on qualities of size, form, colour of flower regulated by canons appreciable only by connoisseurs. Baron Schroeder sold a unique plant of *Cypripedium Stonei*, var. Platylœmium, for £365; another connoisseur paid £340 for a variety of *Aerides Lawrenceæ*. The ordinary form of the latter may be obtained for about two guineas per plant, and that of the preceding species for half a guinea each, simply because they are more or less plentiful, while rare or unique forms command hundreds of pounds sterling. These unique forms make their appearance very generally without any exercise of skill on the part of the fortunate possessor. They may be bought along

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with ordinary or typical varieties of the species to which they belong, and not having been seen in flower by the dealer, their intrinsic value is not known to him. Thus *Cattleya Thomsonii* originated in part of an importation of *Cattleya Mossiæ* and other species received from South America. Only one small plant appeared in a numerous batch of plants, with the unique characteristics of the one in question, which was readily bought for £200.

The cultivation of orchids is accounted a difficult branch of the gardener's art. When the value of a considerable collection of rare kinds is considered, their successful management is at least a responsible undertaking. To be successful in their treatment the cultivator should above all things be well informed regarding the conditions under which each species grows in its native habitat. The prevailing temperature and other atmospheric conditions during the periods of growth and of rest, and the amount of shade or of light to which they are exposed at those seasons, must be known to and comprehended by the cultivator before he can adapt his means to the end in view. Houses or compartments of houses are set apart for the accommodation of species which are natives of the more hot and humid parts of the world, such as tropical East India, Madagascar, and Brazil, and a similar arrangement is made for those from Mexico and Central America. The management of the atmosphere of these houses is then based on such knowledge as the cultivator possesses regarding the temperature and moisture, light and shade, that prevail in the countries the several species are natives of. The plants of truly epiphytal habit are usually cultivated on blocks of oak, teak, or other timber, with or without moss about their roots for the retention of moisture. All classes are also grown in pots or lattice-baskets, in rough fibrous peat and Sphagnum moss largely intermixed with charcoal and porous crocks, to secure abundant drainage.

Fig. 5.—Oncidium Kramerianum.

Only the terrestrial species are grown in soil proper, and as there are exceedingly few of such that require the accommodation of special houses, space need not here be taken up with their requirements. The propagation of orchids is effected by division of the root-stocks, by separating the pseudo-bulbs in some cases, by cuttings in the case of Dendrobiums, and some others with similar forms of growth, and by seed in all cases when it can be obtained, which rarely occurs with cultivated plants except they have been artificially fertilised. Increased interest in orchids has in recent years been evoked by the success that has attended the efforts of hybridists to unite the desirable features of the flowers of any two species in one form. The pioneer in this branch of orchid culture was Mr Dominy of London, whose first success occurred about the year 1860. Many hybrid orchids are now in cultivation, but they all belong to very few genera; certain species of Calanthe, Cattleya, Cypripedium, Dendrobium, and Epidendrum being all that have yet yielded to the hybridist's art.

Few orchids yield products useful to man. Of these the Vanilla (q.v.) is perhaps the best known in commerce. The leaves of *Angræcum fragrans*, a native of the Mauritius, where it is called *Fahum*, and by the French *Isle of Bourbon Tea*, are delightfully fragrant, having the odour of Tonquin bean with the flavour of bitter almonds, and are said in infusion to promote digestion, and to allay coughs, diseases of the chest, and spasms. The roots of Helleborine (*Epipactis latifolia*), a British species, are said to allay arthritic pains. Those of *Himantoglossum hircinum*, *Spiranthus autumnalis*, and *Platanthera bifolia* are reputed to be aphrodisiac. The flowers of *Gymnadenia conopsea*, a native of Britain, have been administered in dysentery. In North America the tubers of Arethusa are used to stimulate indolent tumours and to allay toothache. The roots of *Spiranthus diuretica* are much esteemed as a diuretic in Chili. The rhizomes of *Cypripedium pubescens* and of *C. parviflorum* are regarded by American practitioners as an excellent substitute for Valerian as a gentle stimulant. The tubers of *Aplectrum hyemale* are so viscid that they are called Putty-root in the United States, and are there used for cementing broken earthenware.

See Sander's *Reichenbachia*; Veitch's *Manual of Orchids*; *The Amateur's Orchid Guide*, by Britten and Gower; and Watson, *Orchids: their Culture and Management* (1890).

ORCHIS is a genus of Orchideæ, to which, as now restricted, ten of the British species are referred. Some of them are among the most common of British Orchideæ, adorning meadows and pastures with their flowers in summer. It is a rather numerous genus, chiefly spread over Europe, northern Asia, and a very few of the species belong to North America. The British species have mostly red or lilac flowers, sometimes white or green, and often beautifully mottled. The roots of some of the species when dried constitute the salep of commerce, which reduced to a fine powder, and mixed with boiling water, sugar, and milk, makes an excellent diet drink. *O. mascula* and other British species yield such an excellent fecula that it has been suggested the production of salep might be made a profitable industry in England. The accompanying figure gives an idea of the general features of the genus.

Orchis mascula:
a, the lip of the perianth.

Orchil. See ARCHIL.

Orchom'enos, an ancient city of Bœotia, the capital of the kingdom of the Minyæ, was situated at the north-western corner of Lake Copaïs, where it is joined by the Cephissus, and extended from the marshy edges of the lake up the face of a steep rocky hill, on which stood the acropolis. It sent thirty ships to the Trojan war, and at a later date became a member of the Bœotian confederacy. Its government was thoroughly aristocratic, and after the Peloponnesian war the jealous democratic Thebans destroyed it by fire, and sold its inhabitants as slaves. It was rebuilt in the reign of Philip of Macedon, but never recovered its position. It was famous for its musical festival in honour of

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the Graces, who were specially worshipped in the city. In 1880 Schliemann excavated there an old 'treasury,' or rather royal tomb or mausoleum, still larger than that at Mycenæ (q.v.). See O. Müller, *Orchomenos und die Minyer* (1844), and Schliemann, *Orchomenos* (1881).—There was a second Orchomenos in Arcadia, lying NNW. of Mantinea.

Orcin, or ORCINAL, $C_6H_3(CH_3)(OH)_2$. This substance is found in the free state in the lichens from which Archil and Litmus (q.v.) are prepared. It is formed when the acids which occur in these plants are boiled with baryta water or submitted to dry distillation. It is also prepared artificially from the nitro-derivatives of the hydrocarbon toluene. As shown by the formula, orcinal is a di-acid phenol, and appears in large colourless crystals which turn a reddish-brown colour when exposed to the air. By the action of ammonia and the oxygen of the air it is converted into orcein, $C_7H_7NO_3$, which is the colouring matter of archil.

Ordeal (A.S. *ordél*, *ordál*, the prefix *or-* meaning 'out,' and *dél*, *dál*, 'a dealing;' cognates are the Dutch *oordeel*, and Ger. *Urtheil*, 'judgment'), a practice which has prevailed largely among various widely-separated nations, of referring disputed questions, particularly such as relate to the guilt or innocence of an individual, to the judgment of God, determined either by lot or by the success of certain experiments. And there need be no doubt that it is often successful in the detection of a criminal whose trepidation before the dreaded ordeal betrays him, conscious of his guilt, and more than half afraid of the occult influences he is about to outrage. Of its existence among the ancient Jews we have an instance in Numbers v., where a Hebrew woman, accused of adultery, is required to drink the waters of jealousy as a test of innocence; a similar ordeal for incontinence is still in use among the natives of the Gold Coast of Africa. Compurgation of accused persons by fire, as existing among the Greeks, is referred to in the *Antigone* of Sophocles. Among the Hindus the ordeal has been in use to be practised in nine different ways —by the *balance*, by *fire*, by *water*, by *poison*, by the *cosha* or drinking water in which images of the sun and other deities had been washed, by *chewing-rice*, by *hot oil*, by *red-hot iron*, and by drawing two images out of a jar into which they have been thrown.

Livingstone describes the practice of ordeal as common among all the negro races north of the Zambesi. 'When a man suspects that any of his wives have bewitched him he sends for the witch-doctor, and all the wives go forth into the field, and remain fasting till that person has made an infusion of the plant (called *goho*). They all drink it, each one holding up her hand to heaven in attestation of her innocency. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty, and put to death by burning. The innocent return to their homes and slaughter a cock as a thank-offering to their guardian spirits.' The women themselves eagerly desire the test on the slightest provocation; each is conscious of her own innocence, and has the fullest faith in the *muavi* ('the ordeal') clearing all but the guilty. There are varieties of procedure among the different tribes. The Barotse pour the medicine down the throat of a cock or dog, and judge of the innocence or guilt of the person accused by the vomiting or purging of the animal. The Calabar Bean (q.v.) is also used for the purposes of the ordeal.

Throughout Europe in the dark ages the ordeal existed under the sanction of law and of the church, and was closely related to the oath. The most prevalent kinds of ordeal were those of *fire*, *water*, and the *wager of battle*. *Fire ordeal* was only allowed to persons of high rank. The accused had to carry a piece of red-hot iron for some distance in his hand, or to walk nine feet barefoot and blindfolded over red-hot ploughshares. The hand or foot was bound up and inspected three days afterwards; if the accused had escaped unhurt he was pronounced innocent; if otherwise, guilty. Under such a judicial system there were probably few acquittals; but there can be little doubt that in the severer kinds of ordeal precautions were taken by the clergy to protect those whom they wished to clear from suspicion. And the feats of modern jugglers suggest possibilities of official trickery which may at once have saved the credit of the ordeal and cleared those meant to be acquitted. Queen Emma, mother of Edward the Confessor, when suspected of a criminal intrigue with Alwyn, Bishop of Winchester, triumphantly vindicated her character by walking unhurt over red-hot ploughshares. *Water ordeal* was the usual mode of trial allowed to bondsmen and rustics, and was of two kinds—the ordeal of *boiling water* and of *cold water*. The ordeal of *boiling water*, according to the laws of Athelstan, consisted of taking a stone out of boiling water, where the hand had to be inserted as deep as the wrist; what was called the triple ordeal deepened the water to the elbow. The person allowed the ordeal of *cold water*—the usual mode of trial for witchcraft—was flung into a river or pond; if he floated without any appearance of swimming he was judged guilty; while if he sank he was acquitted. The *wager of battle* was a natural accompaniment of a state of society which allowed men to take the law into their own hands. The defeated party, if he craved his life, was allowed to live as a 'recreant,' that is, on retracting the perjury which he had sworn to.

Other kinds of ordeal were practised in particular circumstances in different parts of Europe. In the ordeal of the *bier*, a suspected murderer was required to touch the body of the murdered man, and pronounced guilty if the blood flowed from his wounds. Undoubtedly this touched a primitive time, when death was not fully understood, and the lifeless body was supposed still capable of thought and action. And to this day English peasants expect every one who sees a corpse to touch it to show that he bears the dead no ill-will. The ordeal of the *eucharist* was in use among the clergy: the accused party took the sacrament in attestation of innocence, it being believed that, if guilty, he would be immediately visited with divine punishment for the sacrilege. A somewhat similar ordeal was that of the *corsned*, or consecrated bread and cheese: if the accused swallowed it freely he was pronounced innocent; if it stuck in his throat he was presumed to be guilty. Godwin, Earl of Kent, in the reign of Edward the Confessor, when accused of the murder of the king's brother, is said to have appealed to the ordeal of the corsned, and been choked by it. There can be no doubt that the popular English asseveration 'May this bit choke me if I lie!' is a distinct survival. An early form of ordeal, abolished by Louis le Debonnaire in 816, was that of the *cross:* the accuser and accused stood upright before a cross, and he who first fell, or shifted his position, was pronounced guilty. It was done away with as being irreverent towards the mystery of the cross. Besides these, there was the ordeal by *lot*, dependent on the throw of a pair of dice, one marked with a cross, the other plain.

Trial by ordeal at first carried with it the sanction of the priests as well as of the civil power, though the clergy in the course of time came to discountenance it. In England it seems to have been continued till the middle of the 13th century.

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On the Continent it was, generally speaking, abolished rather earlier, although as late as 1498 we find the truth of Savonarola's doctrine put to the test by a challenge between one of his disciples and a Franciscan friar to walk through a burning pile. In Scotland in 1180 we find David I. enacting, in one of the assemblies of the frank tenantry of the kingdom, which were the germ of parliaments, that no one was to hold an ordinary court of justice, or a court of ordeal, whether of battle, iron, or water, except in presence of the sheriff or one of his sergeants; though, if that official failed to attend after being duly summoned, the court might be held in his absence. The first step towards the abolition of this form of trial in Saxon and Celtic countries seems to have been the substitution of compurgation by witnesses for compurgation by ordeal. The near relatives of an accused party were expected to come forward to swear to his innocence. The number of compurgators varied according to the importance of the case; and judgment went against the party whose kin refused to come forward, or who failed to obtain the necessary number of compurgators. To repel an accusation it was often held necessary to have double the number of compurgators who supported it, till at length the most numerous body of compurgators carried the day.

See the articles BATTLE (WAGER OF), DIVINATION, and MAGIC; also the works of Bastian, Grimm, Tylor, and Waitz *passim*; Tylor's article, 'Ordeals and Oaths,' in *Macmillan's Magazine* for 1876; H. C. Lea's *Superstition and Force* (Phila. 1866; new. ed. 1878); and George Neilson's *Trial by Combat* (1890).

Order, in Natural History, a group inferior to *class* and *sub-class*, but superior to *family*, *genus*, &c. The term NATURAL ORDER is used in Botany to express genuine relationship in contrast to purely artificial grouping, but all orders now recognised are supposed to be more or less 'natural.' See GENUS, SPECIES.

Ordericus Vitalis, a mediæval historian, born at Atcham near Shrewsbury in 1075. He was the son of Odeler of Orleans, who in Roger de Montgomery's train had accompanied the Conqueror to England, and from childhood was dedicated to God. At ten he was sent to Normandy to be educated for the monastic life in the abbey of St Evroul. Here he spent all his life, although he made several visits to England to collect historical materials. He became a priest in 1107, and died most probably about 1143. Between the years 1130 and 1141 Orderic compiled his *Historiæ Ecclesiasticæ*, an elaborate work on the history of Normandy and England, preceded by a brief chronicle of events from the birth of Christ down to his own time. The work is a singular mixture of important history and trivial gossip, marred by absolute lack of order, grotesque style, and laboured grandiloquence; but its writer possessed the seeing eye and the sympathetic heart, and the result is that his confused book remains a precious storehouse to the historian, abounding in those truthful photographic glimpses of reality which are beyond the reach of all the laborious erudition of a later age. With the Conquest it becomes of great value as an honest and trustworthy contemporary source.

The first edition of the *Historiæ Ecclesiasticæ* was published by Duchesne, in his *Hist. Norm. Scrip.* (1619). It has also been printed by the French Historical Society (1840), and was translated into English by T. Forester (4 vols. 1853–56) in Bohn's *Antiquarian Library*. The best edition is that by A. le Prevost (5 vols. Paris, 1838–55). See chap. vi. of Dean Church's *St Anselm* (1870).

Orderlies are non-commissioned officers or soldiers employed as messengers or attendants. Thus, in the British army, each general or commanding officer has an orderly always at his disposal; a *Post-office Orderly* fetches the letters of each corps; and when a court-martial or board of officers is convened, a non-commissioned officer is appointed as *Court-orderly* to attend upon it. The men of the medical staff corps, when on duty with the sick, are also called *Hospital-orderlies*. The *Orderly-officer* is the officer on duty for the day in each corps. He attends all parades, inspects rations, visits the barrack-rooms at the dinner-hour, hospital, cells, guardroom, &c., remaining in uniform and on duty in barracks the whole day. Similarly, an *Orderly Non-commissioned Officer* of each corps is on duty for the week, calls the roll, warns men for parade, copies orders, &c. The regimental *Orderly-room* is the office where the lieutenant-colonel, assisted by the adjutant and a staff of clerks, transacts his business and sees prisoners daily. Each troop, battery, or company has a similar *Orderly-room* for the use of its commander. The *Orderly-book* or *Order-book* contains the general or regimental orders, which are copied into it as they are issued.

Orders, HOLY, an institution, regarded in the Greek and Roman churches as a sacrament, by which ministers are specially set apart for the service of religion. While some of the reformed churches altogether deny the distinction of ranks in the ministry, none of them admits more than three ranks, of bishop, priest, and deacon. But in the Roman and Greek churches a distinction is made between the major or holy orders and the minor orders. The major orders are those of bishop, priest, and deacon (see the articles under those heads). A fourth rank of sub-deacons is generally regarded as one of the major orders, but its functions closely resemble in their nature and their degree those of the deacon. Some theologians, it should be noted, regard the episcopate not as a separate order, but as the completion and extension of the priesthood. The minor orders in the Roman Church are four in number—those of door-keeper, reader, exorcist, and acolyte. To none of these orders is any vow of celibacy annexed. Some of their functions had their origin in the peculiar religious condition of the early church. Preparatory to the receiving of these orders candidates are initiated in the *Tonsure* (q.v.). In the Roman Church the sacrament of holy orders is held to produce an indelible character, and therefore to be incapable of being forfeited and of being validly repeated. The Greek Church has also the distinction of major and minor orders; but all the functions of the four minor orders of the Roman Church are united by the Greeks in one single order, that of reader (*anagnōstēs*).

In the Anglican and other Reformed Episcopal churches the three higher orders of bishop, priest, and deacon are alone retained. An Anglican clergyman may be deprived of his benefice, or suspended by his bishop for various ecclesiastical offences. But, in the usual case of deprivation, the clergyman does not forfeit his status of priest or deacon, which can only be lost by deposition or *degradation*. A bishop may be deprived of his see by his metropolitan, with or without the co-operation of a synod of the bishops of the province, but it has been questioned whether he can be lawfully deprived of his orders as bishop. Till 1870 a clergyman of the Church of England could not become a member of the House of Commons (see CLERGY). In the Presbyterian and other non-episcopal churches the ceremony of ordination is not held to impart any indelible character. A minister found guilty of heresy or immorality is deprived of his office by *deposition*, by which his clerical status is forfeited. A minister deposed ceases altogether to be a minister, and is no more capable of any of the

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functions of the office than if he had never been ordained. There is nothing to prevent a minister of the Church of Scotland, or any Presbyterian or Independent church, from being a member of the British House of Commons.

The use of a ceremonial for ordination is traceable among the Jews, and the New Testament contains frequent reference to the specific ceremonial of 'laying on of hands' (Acts, vi. 1–7, xiii. 1–4, xiv. 23; 1 Tim. iv. 14, v. 22; 2 Tim. i. 6). In the Roman, the Greek, and the other eastern churches this rite of ordination is held to be sacramental, and it is reserved, at least as regards the major orders, exclusively to bishops. In extraordinary cases it was permitted to cardinals and to certain abbots to confer the minor orders. Considerable controversy exists among Catholic writers as to what are the essential portions (*Materia Sacramenti*) of the rite of ordination. Some place it in the 'imposition of hands,' some in the 'presentation of the instruments' symbolical of each order. As regards the *validity* of the rite of ordination, the mere fact of its being conferred by a bishop suffices; but there is not any part of the Roman discipline which is more jealously guarded by laws than the administration of orders. The candidate can only be *lawfully* ordained by 'his own bishop' (*proprius episcopus*), or with the authority of his own bishop, who is 'his own' in respect of birth, of domicile, of benefice, or of connection by personal service.

In the Church of England and other Reformed Episcopal churches the rules of the ancient canon-law are retained, by which no one could be ordained without previous examination of his fitness, or who was disqualified by bodily infirmity, illegitimacy, immorality, or simony, or who was unprovided with a title (i.e. an appointment to serve in some church) which should provide him with a maintenance; or who, being a candidate for deacon's orders, was under twenty, and for priest's, under twenty-four years of age; but the age for admission to deacon's orders is changed to twenty-three.

In other Reformed churches ordination is performed by the presbytery by imposition of hands, or by one or more ordinary ministers. Some smaller Protestant denominations have no ceremony of ordination whatever.

Orders in Council, orders by the sovereign with the advice of the Privy-council. The Privy-council of Great Britain has no power to legislate, except so far as authorised to do so by parliament; but in periods of emergency it has nevertheless occasionally issued and enforced orders of a legislative kind; those who were concerned in passing, promulgating, or enforcing the orders trusting to parliamentary protection, and taking on themselves the personal responsibility of the proceeding. In such cases an act of indemnity afterwards passed has relieved from liability those who advised the order or acted under it, and given compensation to all who suffered by its enforcement. This course was adopted in 1766 with regard to an embargo on the exportation of corn, issued in consequence of a deficient harvest and prospect of famine. An important constitutional question was raised by the famous Orders in Council issued by Great Britain in 1807 and 1809, in reprisal for Napoleon's Berlin and Milan decrees. See CONTINENTAL SYSTEM.

Orders of Knighthood or Chivalry, with their respective statutes and insignia, seem to have been the result of the desire to institute a superior class among those who devoted themselves to arms, and may be said to have originated between the age of Charlemagne and that of the Crusades; though the Romans, in their equestrian order going back to the 6th century B.C., and many other of the ancient nations, had similar distinctions. Their nature, and their connection with the religious orders will be found explained in the article KNIGHTHOOD; here we need only give a brief list of the existing orders which either have survived the invention of gunpowder, to become, generally, marks of favour from the sovereign, who in almost all the orders is grand master, or which have been instituted since, to reward military or civil service or mark personal favour.

AUSTRO-HUNGARY.—The *Order of the Golden Fleece* (1429), second only in rank to the 'Garter,' will be found described at GOLDEN FLEECE.—*St Stephen*, instituted by Empress Maria Theresa in 1764, originally as the national order of Hungary. It consists of the grand master (the sovereign of Hungary), twenty grand-cross knights, thirty commanders, and fifty knights. Badge, cross pattée with gold edges. Ribbon, crimson with two green stripes.—*Leopold*, founded by Francis I., 1808, for 'personal' merit.—*Elizabeth-Theresa*, the second military order of the empire, founded by Empress Elizabeth Christina, 1750.—*Maria-Theresa*, founded by Empress Maria Theresa in 1757 for 'officers distinguished in war.'—*Iron Crown*, originally founded to commemorate the crowning of Napoleon I. as king of Italy in 1805, but revived by Francis I. in 1816, and then named the *Austrian Order of the Iron Crown*. It is given for personal merit only. The present badge is the Austrian eagle in gold, &c., rising from the iron crown and pendant from the imperial crown.—*Order of the Community of Noble Ladies of the Starry Cross*, an order for ladies instituted by the Empress Eleanor in 1668 to commemorate the miraculous preservation of a portion of the true cross. It is restricted to high-born ladies.—The *Teutonic Order*, of very ancient but uncertain origin, conferred on Roman Catholic noblemen and ladies who contribute to its ambulance fund.—*Francis Joseph*, instituted by that emperor in 1849 for distinguished merit in all classes.

BAVARIA has several ancient orders. *St Hubert* was founded by Gerhard V., Count of Ravensberg, to commemorate his victory over Arnold, Count of Egmont, in 1444. It is the highest in the kingdom, and is confined to members of the Bavarian Royal House and foreign sovereigns, princes, and barons. Badge, a gold Maltese cross, guttée, &c., surmounted by the Bavarian crown; ribbon, red, watered, with narrow green borders.—*St George*, originally introduced from the Holy Land in the 12th century, revived by Maximilian I. in 1494, but recognised as instituted by the Elector Charles Albert in 1729. It is only given to Roman Catholics and those having no other order.—*Maximilian Joseph*, a military order founded by the Elector Charles Theodore (1794), was raised to be a royal *order* in 1806 by Maximilian Joseph. It has three classes, and the commoner becomes ennobled by entering it.—*Bavarian Crown*, for civil merit, instituted by Maximilian Joseph in 1808; also confers nobility.—*St Michael*, an order for civil merit without distinction of rank or religion, founded by Joseph Clemens, Duke of Bavaria, in 1693.—The *Maximilian Order*, for art and science, founded in 1853 by Maximilian II. for Germans only.—*Order of Military Merit* (1866).—*Royal Louis Order* (1827).—*Order of Elizabeth*, for ladies of Roman Catholic religion, founded by Elizabeth Augusta (1766).—*St Anne* (1783), for ladies of the nobility, all of its members receiving pensions.—*Theresa* (1827), for unmarried noble ladies.

BELGIUM.—*Order of Leopold*, civil and military, founded by Leopold I. (1832). It has five classes, of which the three inferior have pensions.—*Iron Cross*, for civil merit, founded by Leopold II. (1867).

BULGARIA.—The *Military Order*, instituted by Prince Alexander I. in 1879.

CHINA.—The *Order of the Imperial Dragon* was instituted in 1862 to reward foreigners who had done service to the empire, founded partly on the model of the British order of the Bath. The first foreigner decorated was Colonel (General) Gordon. It was put on a more permanent footing in 1882, and called the *Order of the Double Dragon*. It has five subdivided grades, most carefully specified, ranging from 'sovereigns' to 'commercial classes,' which are distinguished by different kinds of 'pearls' or hemispherical stones. It is this peculiar method of Chinese distinction which is irreverently termed 'buttons' by foreigners.

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DENMARK.—The *Order of the Elephant* claims to be as old as the First Crusade, but Christian V. in 1693 altered its statutes and gave it its present title. It is rarely given, and is valued in consequence, and has only one class of thirty knights, exclusive of princes of the blood. Badge, a white elephant with golden tusks, &c. Ribbon, watered, light blue.—*Order of the Dannebrog* was said to have been instituted by Waldemar II. in 1219, to commemorate a miraculous intervention in a battle, but also renovated by Christian V. in 1693, and altered from a court honour to an order of merit by Frederick VI. in 1808. It has five classes. Badge, an oblong Danish cross, enamelled white with red border. Ribbon, white with two red edges.

FRANCE has allowed all its old chivalric orders to lapse, and has now only the *Legion of Honour* (q.v.), which has the advantage of being adapted to any form of government.

GERMANY. See the sections on Prussia, Bavaria, Saxony, and Würtemberg.—Many of the minor German states also have orders, the principal of which are the following: Anhalt, *Albert the Bear* (1807, but claiming to date from about 1382).—Baden, *Order of Loyalty* (1715), for princes and 'excellencies;' *Charles Frederick*, military (1807); *Lion of Zähringen* (1812).—Brunswick, *Henry the Lion* (1834), military, civil, and science and art.—Hesse, *Louis* (1807), civil and military; *House of Philippe le Bon* (1840), merit; *Military Merit*, (1870); *Golden Lion* (1770, revived 1870); *Military Sanitary Cross* (1870), for those, irrespective of rank or sex, who succour sick or wounded soldiers.—Mecklenburg, *Crown of the Wendes* (1864)—it has five classes, the highest open to ladies of exalted rank, ninety-six members being apportioned to Schwerin and thirty-two to Strelits; *Cross of Military Merit* (1814).—Oldenburg, *Order of Merit and of the Ducal House of Peter Frederick Louis* (1838), open to all distinguished in science, art, and domestic virtues.—Saxe-Gotha and Altenburg, *Order of Saint Ernest* (1825), ennobles its holders.—Saxe-Weimar Eisenach, *White Falcon* (1732, remodelled 1815), for 'twenty-four exalted personages in the civil or military service,' &c.

GREAT BRITAIN.—The *Most Noble Order of the Garter*, which stands pre-eminent amongst the orders of knighthood, will be found described at GARTER.—*Orders of the Thistle* (Scotland), *St Patrick* (Ireland), *Bath*, and *St Michael and St George* are all described under their respective titles. For the *Orders of the Star of India, Indian Empire*, and *Crown of India*, see INDIAN ORDERS.—*Order of Victoria and Albert*, instituted in 1862 by Queen Victoria for ladies. Badge, the heads of the Empress-Queen and Prince Consort, surmounted by the imperial crown.—*Military Order, and Order of Merit of British India*, instituted in 1837 to reward meritorious services in the native army of India, by native and European officers. Badge, gold star of eight clusters of rays, surmounted by the imperial crown.—*Order of Merit*, also for India, instituted in 1837 to reward personal bravery irrespective of rank. Badge, eight-pointed star, in centre two cross swords, on a wreath 'Reward of Valour.'—The *Distinguished Service Order* (1886), 'for rewarding individual instances of meritorious and distinguished services in war.'

GREECE.—*Order of the Redeemer*, founded by King Otho in 1833 to commemorate the deliverance of Greece. Conferred for distinction of all kinds.

ITALY.—*Order of the Annunziata*, the third in rank of all orders, claims to have been founded in 1362 by Amadeus VI., Count of Savoy. It was revived by Charles III. in 1518, and was finally modified by Victor Emmanuel II. in 1869, who restricted the knights to twenty, exclusive of the sovereign, foreign princes, and certain others. Badge, a gold medallion representing the holy annunciation, surrounded by interlaced love-knots.—*St Maurice and St Lazarus*, formed by the union of two distinct orders, the first dating from the 15th century, and the latter claiming to have been in existence in Jerusalem in 1000. After many changes it was decreed new statutes by Victor Emmanuel II., who made the number of knights unlimited.—*Military Order of Savoy*, instituted by Victor Emmanuel I. in 1815, altered by Victor Emmanuel II. in 1855. It has four classes.—*Civil Order of Savoy*, instituted by King Charles Albert in 1831, limited to sixty knights 'who have contributed to the service of the king and the welfare of the state.'—The *Crown of Italy*, instituted by Victor Emmanuel II. in 1868 to commemorate the annexation of Venetia. The number of knights is practically unlimited.—*Order of the Chivalry of San Marino* was instituted by the grand council of the Republic in 1859.

JAPAN possesses two orders—*The Rising Sun*, for civil and military merit, instituted in 1874; and the *Order of the Chrysanthemum* (1876), which the Mikado himself wears. It is mostly conferred on princes of the blood and foreign sovereigns, the first foreigner to receive it being Czar Alexander II. of Russia. Badge, a yellow enamel chrysanthemum variously ornamented.

LUXEMBOURG has one order, the *Oaken Crown*, instituted for all classes by William II. of the Netherlands in 1841.

MONACO has the *Order of St Charles* (1858).

MONTENEGRO has two orders—*Danilo the First* (1852), for civil merit; and *St Peter* (1852), for members of the reigning house exclusively.

NETHERLANDS.—The *Order of William*, founded by William I. in 1815, is to reward conspicuous military gallantry; and the *Order of the Netherlands Lion* (1815) rewards civil merit. There is also the *Order of the Golden Lion* (1858) as a family order of the House of Nassau.

PERSIA.—The *Order of the Sun and Lion*, instituted in 1808; and the *Order of the Sun* (1873), for ladies.

PONTIFICAL.—The *Order of St Gregory the Great* was established by Pope Gregory XVI. in 1831 as a reward for zeal in the cause of the Roman Catholic religion.—The *Order of Christ*, dating from 1319, is similar to the Portuguese order of the same name, except that noble birth is not indispensable to admission.—The *Order of St Sylvester* claims a very early foundation, but seems to have really originated in 1559. Gregory XVI. in 1841 restricted its application to zeal in the cause of the church and civil virtues. The *Order of Pius* was founded in 1847 by Pius IX., and confers nobility. The *Order of the Holy Sepulchre* claims to date from 1099, and was confirmed by Benedict XIV. in 1746. Pius IX. added new statutes in 1868.—The *Order of St Cecilia* was founded in 1847 by Pius IX.—For the *Order of St John of Jerusalem*, see HOSPITALLERS.

PORTUGAL.—The military *Order of St Benedict of Aviz* originated in 1143 in a society of noble Portuguese for the purpose of opposing the Moors. It remained a military order until 1789, when Donna Maria converted it into an order of merit of three classes. Badge, a lily cross, enamelled green with gold edges.—*St James of the Sword*, originated in Spain in 1175, but separated from that country shortly afterwards. It was converted into a merit order by Donna Maria.—The military *Order of Christ* was founded on the abolition of the *Order of the Temple* (see TEMPLARS), and is another branch of the Pontifical order of the same name. It is only open to Roman Catholics of noble birth. Badge, red enamelled cross, charged with a plain white cross.—*Order of the Tower and Sword*, for merit, was originated in 1808, but remodelled under its present name in 1832.—*Order of Isabella*, for ladies, was founded in 1801.—The *Order of Our Lady of the Conception of Villa-Viciosa* was founded by John VI. in 1818 for both sexes.

PRUSSIA has no very ancient orders, although the *Order of the Black Eagle* is held in the highest estimation. It was founded in 1701 by the Elector of Brandenburg to commemorate his coronation as king of Prussia (Frederick I.). It is limited to thirty knights (exclusive of princes of the royal blood), who must prove a noble descent for four generations. Badge, a blue enamelled Maltese cross, with a black eagle displayed in each angle; in the centre the royal cipher F.R. with the motto *Suum cuique*.—The *Order of the Red Eagle* was originated in 1705, and was raised to the second rank by Frederick William II. Only those having it can receive the *Black Eagle*. The badge is similar to the Black Eagle, except that the cross is white and the eagle red.—*Order of the Crown* was instituted in 1861 by William I. to commemorate his coronation as king of Prussia. It is for meritorious services in presence of the enemy, and ranks equal to the Red Eagle. Badge, white enamelled gold cross with gold edges, having in the centre the royal crown on a gold field surrounded with a blue fillet inscribed *Gott mit Uns*.—*Order of Military Merit*, converted into an order 'for merit' from an older order by King Frederick II. in 1740.—A new *Royal and Protestant Order of St John of Jerusalem* was founded in 1812 by

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Frederick-William III., which received a new constitution from Frederick-William IV. in 1852 (see HOSPITALLERS). —*Order of Civil Merit* in arts and sciences was founded by Frederick-William IV. in honour of the memory of Frederick II.—*Order of Louisa* was founded in 1815 by Frederick-William III. for women's services in war.—*Order of the House of Hohenzollern*, founded in 1851.

ROUMANIA.—The *Order of the Star*, for civil and military merit, instituted by Prince Charles in 1877.—*Order of the Crown of Roumania*, founded in 1881 by the king of Roumania.

RUSSIA, like Prussia, has no very ancient orders, though entry into all of them creates nobility.—The *Order of St Andrew*, the patron saint of Russia, founded in 1698 by Peter the Great, is the highest in the empire. It carries with it the orders of *St Anne*, *Alexander Nevsky*, and *St Stanislaus*. Badge, the Russian double-headed eagle charged with St Andrew on an azure cross, and surmounted by the imperial crown.—*Order of St Catharine*, founded by Peter the Great in honour of his consort Catharine I. in 1714, is now restricted to ladies.—*Order of Alexander Nevsky*, instituted by Catharine I. in 1725 in honour of Alexander, son of Jaraslov, Prince of Novgorod (1240). It is both civil and military, the latter open to no one under the rank of major-general.—*Order of St Anne*, founded in 1735 by Duke Frederick Charles Frederick of Holstein-Gottorp in memory of the Empress Anne, and declared a Russian order in 1796 by Paul III. —*Order of St George*, instituted in 1796 by Catharine II. for officers of the army and navy.—*Order of St Vladimir*, founded by Catharine II. in 1782 as an order of civil and military merit. Among other qualifications, 'whoever, at the peril of his life, saves ten lives from fire or water' may claim it.

The POLISH orders of the *White Eagle*, an old order supposed to date from 1325, 'restored' in 1807, *St Stanislaus*, founded by Stanislaus Augustus Poniatowski in 1765, and *Military Merit*, by Stanislaus Augustus in 1792 and revived at Warsaw in 1807, were in 1831 united with those of Russia.

SAXONY.—The *Order of the Crown of Rue* was founded in 1807 by King Frederick Augustus, at the suggestion of Napoleon I.—*Order of Albert the Valorous*, for merit in science, art, and civil virtue, instituted by King John in 1850.—*Order of St Henry*, for merit on the battlefield, founded by Augustus III., king of Poland and Elector of Saxony in 1739.—*Order of Civil Merit*, founded in 1815 by King Frederick Augustus on his restoration.—*Order of Sidonia*, for ladies, founded in 1870 by King John as a reward for services during war.

SERVIA has three orders: the *Double-headed White Eagle*, founded by Milan I. in 1883 to commemorate the re-establishment of the kingdom, is conferred for services to the king or country.—The *Cross of Takovo*, founded in 1865 by Prince Michael, is for services to the cause of Servian independence.—The *Order of St Sava*, for services to education, literature, or the church, was instituted in 1883.

SIAM.—The *Royal Order of the White Elephant* was instituted in 1861, and consists of five classes. It is the highest of Siamese orders, and was accepted by the Empress-Queen Victoria. Badge, a beautifully enamelled white elephant, surrounded by a triple circlet of leaves in yellow, red, and green enamel, and surmounted by the Siamese crown.—The *Order of the Crown*, the second order in Siam, instituted by the king of Siam in 1869.—Other orders are *Chulachondas*; the *Sacred Order*, said to have been instituted in 1782; and the *Order of Maha Chakrakri*, founded by the king of Siam in 1882 in honour of the centenary of his capital.

SOUTH AND CENTRAL AMERICAN STATES.—Brazil, prior to the establishment of a republic in 1890, had four orders—*Order of Pedro* (1827); *Order of the Southern Cross* (1822); *Order of the Rose* (1829), all instituted by Dom Pedro I.; and *Order of St Benedict of Avis*, *St James of the Sword, and of Christ*, taken to Brazil when a dependency of Portugal, and proclaimed as 'national' in 1823.—Bolivia and Peru—*Legion of Honour* (1866).—Honduras—*Order of Santa Rosa* (1866).—Nicaragua—*Order of St John of Nicaragua* (1857).—Venezuela—*Order of the Bust of Bolivar* (1825).

SPAIN.—The *Order of Calatrava* was instituted to commemorate the recovery of that town from the Moors in 1147. Convents of nuns were attached to the order in 1219 and in 1479. In 1523 Charles V. vested in the crown of Spain the grand mastership of the orders of *Calatrava*, *Alcantara*, and *St James*. Badge, on a gold lozenge a red fleur-de-lis cross.—*Order of St James of Compostella*, founded in 1175 in honour of the relics of the patron saint of Spain, believed to be preserved at Compostella. It is now purely military. Badge, a red enamel sword with fleur-de-lis hilt, in an oval white enamel medallion with a red border.—*Order of Alcantara* (q.v.), instituted in 1177 by Pope Alexander III., but the name Alcantara was only assumed in 1213 on their getting possession of that place. Badge, same as Calatrava, but green.—*Order of Our Lady of Montesa*, founded in 1317 by James II. of Aragon and Valencia.—The *Golden Fleece*, identical with the Austrian order of the same name (see GOLDEN FLEECE).—*Order of Charles the Third*, founded by that sovereign in 1771.—*Order of Maria Louisa*, founded by Charles IV. in 1792 for 'noble ladies.'—*Order of St Hermengilde*, founded by Ferdinand VII. in 1814 for officers of the army and navy.—*St Ferdinand*, founded by Ferdinand VII. in 1811 for military exploits, includes a class for subaltern officers and soldiers.—*Isabella the Catholic*, founded by Isabella of Portugal in 1815 for defence of the American possessions.—*Beneficencia*, established by royal decree in 1856 for humane and useful public service.—*Naval Merit*, founded on the 'Marine Cross' of 1816, in 1866.—*Maria Isabella Louisa*, instituted in 1833 to reward the lower ranks of officers, in honour of the king's 'august daughter.'—*Military Merit*, founded by Queen Maria Isabella Louisa in 1864.

SWEDEN AND NORWAY.—*Order of the Seraphim*, or *Blue Ribbon*, of doubtful origin, but assigned to King Magnus (1280), revived in 1748 by Frederick I. It has twenty-four Swedish and eight foreign knights, who must not be under rank of lieutenant-general.—*Order of the Sword*, or *Yellow Ribbon*, ascribed to Gustavus Vasa and revived by Frederick I. in 1748.—*Order of the Pole Star*, or *Black Ribbon*, founded in 1748 by Frederick I. for civil merit.—*Order of Vasa*, founded by Gustavus III. on his coronation in 1776 to reward services in developing the natural resources of the country. It has a green ribbon. —*Order of Charles the Thirteenth*, founded by that monarch in 1811 for freemasons of high degree. It has a red ribbon. This is memorable as the only knightly order into which only freemasons are admitted.—*Order of St Olaf*, founded by King Oscar in 1847 in memory of St Olaf, who in 1015 threw off the yoke of Denmark. It is open to the meritorious of all classes. Red ribbon with blue and white borders.

TURKEY.—*Order of the Nishani Medjidi*, established by Sultan Abd-ul-Medjid in 1850 for good conduct in the Turkish service. It has five classes, the first having fifty and the last six thousand members, not including foreigners who may receive it.—*Nishani Osmanie*, instituted in 1862. It has four classes for services to the state, military and civil.—*Nishani Shefakat*, instituted in 1877 for ladies, to commemorate the 'Turkish Compassionate Fund' under the auspices of Baroness Burdett-Coutts.

WÜRTEMBERG.—*Order of the Crown of Würtemberg*, formed in 1818 by the union of an older order with Frederick I.'s *Order of Civil Merit* of 1806. It confers personal nobility on civilians.—*Order of Frederick*, a military order founded by King William in 1818 in honour of his father.—*Order of Military Merit*, instituted in 1759 by Duke Charles Eugène.—*Order of Olga*, for ladies, founded by King Charles X. in 1871 in honour of his queen, Olga, and is bestowed for special service in the field, for both sexes.

In addition there are many minor governments which have orders. Hawaii has three, *Kamehamaha* (1865), *Kalakaua* (1874), and *Kapiolani* (date uncertain). Abyssinia, Cambodia, Liberia, Zanzibar, &c. have one each.

A complete account of all the orders, fully illustrated, with a complete bibliography of the subject, will be found in *Orders of Chivalry*, by Major J. H. Lawrence-Archer (Lond. 1887), to which work we are indebted for much of our information. See also Elias Ashmole, *Institution of the Garter and other Military Orders* (1693); Clark's *History of the Orders of Knighthood* (1784); Hansen, *The Orders of Europe* (1802); Carlisle, *Foreign Orders of Knighthood* (1839); Nicholas, *History of British Orders of Knighthood* (1842); Sir Bernard Burke, *Book of the Orders of Knighthood* (1858).

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Orders, Religious. See Monachism, Military Orders.

Ordinaries. See Heraldry.

Ordinate. See Geometry.

Ordination. See Orders (Holy).

Ordnance. See Cannon, Firearms, Machine Gun, Mortar, &c.

Ordnance Survey. By this term is understood the various operations undertaken by the British government for preparing maps and plans of the whole kingdom and its parts, the term 'ordnance' being applied from the fact that during its earlier days the survey was carried out under the direction of the Master-general of the Ordnance. The idea of a general map of any portion of the country to be executed by the government was first proposed after the rebellion in 1745, when the want of any reliable map of the northern parts of Scotland was much felt by the officers in command of the royal troops. Its execution was entrusted to Lieutenant-general Watson, the deputy quartermaster of North Britain; but it was mostly carried out by Major-general Roy, an officer of engineers. The drawing, on a scale of 1¾ inch to the mile, was completed in 1755; but, in consequence of the war which broke out in that year, was never published. In 1784, with the object of calculating the difference of longitude between the observatories of London and Paris, a base-line was measured by General Roy, R.E., on Hounslow Heath, from which started a series of triangles extending to Dover. This triangulation was connected with that carried out in France in 1786. The government shortly afterwards decided on having, for military purposes, a general survey on the 1-inch scale of the United Kingdom, and the triangulation carried out by General Roy in the south-eastern counties became the basis of the general triangulation. In 1794 the survey for the 1-inch map was begun, and the first sheet was published in 1801. As the series of principal triangles were extended westwards towards the Land's End, it was thought right to measure another base on Salisbury Plain in 1794; and two base-lines for verification were subsequently measured—one in 1801 at Misterton Carr, and the other in 1806 on Ruddlan Marsh. Though first intended chiefly as a military map, the publication of the survey soon created a desire on the part of the public for better maps, and surveyors were then hired to hasten its progress. This, however, was very slow, the map being at one time entirely suspended during the war in the beginning of the 19th century, and even the parts which were executed, having been done by contract, were found very inaccurate. In this condition the survey of England continued during the first quarter of the century, sometimes delayed by the government from motives of economy, at other times urged on by the county gentlemen, who wished the map either as a hunting-map or for local improvements.

In Scotland the principal triangulation was begun in 1809, but was discontinued in the following year, to enable the persons who had been employed there to carry forward the subordinate triangulation required for constructing the detail maps in England. In 1813 it was resumed, and continued steadily up to 1819; a new base-line having been measured on Belhelvie Links, near Aberdeen, in 1817, and the great sector used at various stations, both on the mainland and in the islands. In 1820 it was again suspended, was resumed in 1821 and 1822, and anew broken off in 1823, the large theodolite being wanted in order to proceed with the principal triangulation in South Britain. In 1824 the survey of Ireland was begun, and nothing more was done in Scotland till 1838, except that some detail surveying for a 1-inch map was continued for a few years in the southern counties. The chief strength of the surveying corps was now transferred to Ireland. A map of that country was required for the purpose of making a valuation which should form the basis of certain fiscal arrangements and other improvements which the social evils and anomalies of Ireland urgently demanded. For this map a scale of 6 inches to the mile was adopted, as best suited for the purposes in view. On this scale the whole map was completed, and published in 1845, though the first portions were in an imperfect form, and needing revision, which was proceeded with in 1873.

The triangulation of Scotland was resumed in 1838, and in 1852 the whole of the primary triangulation of the United Kingdom was completed. It comprises, in all, 250 trigonometrical stations, and the average length of the sides of the triangles is 35·4 miles, the longest being that from Scaw Fell to Slieve Donard, which measures 111 miles. During the triangulation of Ireland a base-line had been measured on the border of Lough Foyle. As a test on the general accuracy of the triangulation the length of this base was afterwards calculated through the series of triangles from the base on Salisbury Plain; the length so found differed from the measured base by only a little more than 5 inches. The distance apart of these two bases is about 360 miles, and their length about 41,641 and 36,578 feet respectively.

The survey of Ireland having been finished in 1840, surveys for a 6-inch map were begun for the northern portions of England which had not been previously mapped on the 1-inch scale. In 1841 some secondary operations for a map of Scotland, also on a 6-inch scale, were begun, but proceeded so slowly that in 1850 only the map of Wigtownshire and some parts of Lewis were completed. Much dissatisfaction having been expressed in Scotland by the press and public bodies as to the slow progress of the map and the 6-inch scale on which only it was published, a committee of the House of Commons (Lord Elcho's) recommended in 1851 the 6-inch maps to be stopped, and the 1-inch map completed as speedily as possible. This change produced much discussion as to the relative value of the 1-inch and 6-inch scales then in use, and the expediency of adopting a still larger scale as more valuable to the public. Circulars were issued, asking the opinion of various public bodies, and of scientific and practical men, as to the proper scale for a great national survey. The great preponderance of opinion was in favour of a scale of $\frac{1}{2500}$ of nature, or nearly 1 inch to the acre. This scale was therefore ordered by a treasury minute of 18th May 1855 (Lord Palmerston's), and though subsequently stopped, in consequence of a motion by Sir Denham Norreys in the House of Commons in June 1857, was again recommended by a royal commission (December 1857), and ordered to be resumed by another treasury minute (11th September 1858). In 1861 a select committee was again appointed, and reported that it is desirable that the cadastral survey on the scales directed by the treasury minute of the 18th May 1855 be extended to those portions of the United Kingdom that have been surveyed on the scale of 1 inch to the mile only. This recommendation was presently adopted by the government, and the survey has been completed on the following scales: Towns having 4000 or more inhabitants are surveyed on a scale of $\frac{1}{500}$ of the linear measurement, which is equivalent to 126·72 inches to a mile, or one inch to 41⅓ feet; parishes (in cultivated districts) $\frac{1}{2500}$ of the linear measurement, equal to 25·344 inches to a mile, or one square inch to an acre; counties

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on a scale of 6 inches to a mile; kingdom, a general map 1 inch to a mile.

The sheets of the 1-inch map join together, so as to form a complete map of the whole kingdom. This is true also of the sheets on the 6-inch and $\frac{1}{2500}$ scales of each county, but the sheets of different counties, except when drawn to the same meridian, are not connected. The $\frac{1}{2500}$ scale also applies only to cultivated, populous, and mineral districts; the Highlands of Scotland, and other extensive moorland and uncultivated tracts, being only surveyed on the 6-inch scale.

The scale, originally 1 inch to a mile, was increased to 6 inches to a mile when the survey reached Yorkshire and Lancashire; these counties being done on that scale as well as on the 1-inch scale. The remaining counties of England were done on the scale of 25 inches to a mile for cultivated districts, and on 6 inches to the mile for the uncultivated and moorland districts. When England was completed a re-survey was begun on the 25-inch scale of those counties which had only been surveyed on the 1-inch scale. The sheets on the scale of 25 inches to a mile (called parish maps) are reduced by photography, and issued on the scale of 6 inches to a mile (county maps). The 1-inch maps are again reduced by photography from the 6-inch, and are being published in outline only and also with hills.—The survey of the whole of Scotland was completed in 1877, and the maps for the whole area, on either the 25-inch or 6-inch scales, have been published. On the 1-inch scale two editions are published, one in outline only and another with hills.—In Ireland, as stated, the 6-inch maps have been long published, and are now in process of revision, and a survey on the 25-inch scale has been commenced. A 1-inch map of the whole in outline, and, with the exception of a few sheets, an edition with hills have been published. In all the three kingdoms plans of many of the towns on the 10 and 5 feet scale are also published.

The sketch now given of the history of this great national undertaking will show that it has been conducted at different times on different scales and plans, and that the system now pursued was only adopted after much discussion both in parliament and out of doors. The map was originally begun as a military map, and the scale of 1 inch to the mile chosen, without considering whether some other scale would not offer greater advantages. Many now think that a scale a little larger, and an aliquot part of nature, such as $\frac{1}{25000}$, or about $1\frac{1}{4}$ inch to the mile, would have been preferable for the small map; in which case a scale of $\frac{1}{10000}$ of nature, or about $6\frac{1}{3}$ inches, might have been chosen for the intermediate, instead of the 6-inch scale selected at first for mere local purposes in Ireland. Be this as it may, the arguments in favour of the 1-inch map are that it is the most convenient both as a general and travelling map. For general views of the structure of a country, the distribution and relations of its mountains, plains, valleys, and rivers, the 1-inch is admitted to be superior to the 6-inch, and thus better adapted in the first instance for laying out roads, railways, or other extensive public works, or for the publication of a general geological survey. Such a map, on the other hand, is on too small a scale to admit of correct measurements of small distances; it is in some respects a generalised picture and not a correct plan. The 6-inch maps were at first selected in Ireland as the smallest size on which correct measurements of distances and areas could be made. On them every house and field, and almost every tree or bush, might be laid down. Hence they are superior for working out details, as in minute surveys of railways or roads, or the complex geological structure of rich mineral districts. On such sheets, too, a proprietor or farmer may find every field laid down, and the relative heights indicated by contour lines, and may therefore use them for drainage and other improvements. It has also been proposed to use these 6-inch maps as a record of sales or encumbrances of land, thus lessening the cost and simplifying the transfer of property. On the other hand, their size unfits them for most of the purposes for which the 1-inch map is useful, and the contour lines give a far less vivid and correct impression of the physical features of a country than the hill sketching of the 1-inch map. Most of the purposes of the 6-inch plans are attained in a still more perfect manner from the 25-inch plans or cadastral survey. This last name is taken from the French *cadastre* ('a register of lands'), and is defined (in the *Recueil des Lois*, &c.) as a plan from which the area of land may be computed, and from which its revenue may be valued. The purposes to which these large plans may be applied are as estate plans, for managing, draining, and otherwise improving land, for facilitating its transfer by registering sales or encumbrances; and as public maps, according to which local or general taxes may be raised, and roads, railways, canals, and other public works laid out and executed. In 1870 the Ordnance Survey was transferred from the control of the War Office to that of the Office of Works, and in 1890 to the newly-instituted Board of Agriculture.

Nearly all civilised states have produced trigonometrical surveys, many of them of great excellence as scientific works. The most important are:

Austria, $\frac{1}{288000}$ or ·3447 inches to a mile.
Belgium, $\frac{1}{20000}$ or 3·168 inches to a mile.
Denmark, $\frac{1}{126000}$ or ·792 inches to a mile.
France, $\frac{1}{126000}$ or ·792 inches to a mile, and a reduced map, $\frac{1}{80000}$ or ·1267 inches to a mile.
Germany, $\frac{1}{100000}$ or ·6336 inches to a mile; also $\frac{1}{25000}$ or 2·534 inches to a mile.
Italy, $\frac{1}{25000}$ or 2·534 inches to a mile; also $\frac{1}{100000}$ or ·6336 inches to a mile.
Netherlands, $\frac{1}{80000}$ or 1·267 inches to a mile.
Norway and Sweden, $\frac{1}{400000}$ or ·158 inches to a mile.
Switzerland, $\frac{1}{25000}$ or 2·534 inches to a mile.
United States, from $\frac{1}{120000}$ or ·5 inches to a mile, to $\frac{1}{253440}$ or ·25 inches to a mile.

The Coast and Geodetic Survey of the United States, which was authorised in 1807, but not really begun till 1817, is a work of enormous extent, great accuracy, and minute detail. The full organisation of the survey was mainly due to A. D. Bache (q.v.). The general charts are published on a scale of $\frac{1}{80000}$ or $\frac{1}{4}$ths of an inch to a mile; the harbours and ports $\frac{1}{20000}$ or $3\frac{1}{2}$ of an inch to a mile. A vastly greater undertaking, the triangulation of the whole area of the republic, has been more recently begun. The great Trigonometrical Survey of India was commenced in 1832; and the year 1880–81 witnessed the completion of the principal triangulation of all India. The maps are published on various scales, those of the Trigonometrical Survey being on a scale of $\frac{1}{253440}$, or ·25 inches to a mile, whilst maps on both larger and smaller scales are published for revenue and special purposes.

The Geological Survey of the United Kingdom, though under a different department of government (Science and Art), may be shortly noticed here. The English survey, begun in 1832, was completed on the scale of 1 inch to a mile (solid geology), and the Drift survey proceeded with. The Irish survey was begun in 1840, but was subsequently suspended till 1845. It was completed in 1887, and the whole of the maps are now published. In 1854 the survey was extended to Scotland. The southern half of the country has been completed, and the mapping of the Highlands is now in progress. The surveys

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are made on the 6-inch maps in the parts of the country where these exist, but the results are published on the 1-inch scale only, except some of the mineral districts, which are issued also on the 6-inch scale. Besides the maps, sheets of sections, horizontal and vertical, with valuable memoirs, and monographs on fossils, are also published; and a general index map, scale 4 miles to an inch, is in progress. A survey of the West Indies has been carried out, and memoirs descriptive of the geology of Trinidad, Jamaica, and British Guiana have been published. The geological survey of Canada and that of India are vast undertakings in progress; also government geological and mining surveys are in progress in the Australian colonies. See the articles CONTOUR LINES, MAP, SURVEYING; Colonel White's *Ordnance Survey of the United Kingdom* (Edin. 1886).

Ordovician, a name sometimes given to a geological formation intermediate between Cambrian and Silurian; otherwise accounted the Lower Silurian strata. It is so called from the Ordovices, an ancient British tribe.

Ore-deposits. Any mineral which is obtained by mining, and which contains a workable proportion of a metal, is called by miners an *ore*. Ores are met with in various forms and positions in the earth's crust. Sometimes they are found in gravel, sand, and other alluvial deposits. Examples of this class are afforded by the placers of California (see GOLD), the now exhausted tin-stream works of Cornwall, and the bog iron ores of various localities. In other cases the ores occur disseminated through igneous and sedimentary rocks. Tin ore and magnetic iron ore are frequently met with in this form. When the whole rock is permeated with mineral matter, accumulated in minute veins, the deposit is termed a *stockwork*. Examples of such deposits of tin ore occur at Carclase and other places in Cornwall, and at Altenberg in Saxony. Again, the ores may occur in detached masses. Such, for instance, are the red hæmatite deposits of Ulverston in Lancashire, the brown hæmatite of the Forest of Dean, the iron mountains of Gellivara and Taberg in Sweden, and of Missouri. The ores may occur in regular parallel beds (see MINING) or seams interpolated between rocks of sedimentary origin, as in the case of the ironstone of the coal-measures, and in that of the cupriferous shale of Mansfeld in Prussian Saxony, a seam not more than 5 inches thick which has been worked without interruption since the 12th century. Lastly, ores are met with in tabular masses, known as mineral veins or *lodes*, differing in character from the enclosing rocks. The simplest classification of ore-deposits is that based on their form, into two divisions: (1) tabular deposits, a class subdivided into (*a*) beds, whether interstratified or superficial, and (*b*) lodes; and (2) non-tabular deposits, or masses.

A lode is usually defined as a repository of mineral matter which fills more or less completely a former fissure. Though this definition is undoubtedly true in most cases, deposits are occasionally met with in which the rock at the sides of the fissure, having been so altered as to render it worth working, should be considered as part of the lode. These exceptional cases are included in a more general definition propounded by Dr C. Le Neve Foster, who regards lodes as tabular deposits of mineral, which have been formed subsequently to the rocks by which they are surrounded. Lodes are very variable in thickness, from a mere film up to 150 feet or more. Their longitudinal extent is equally variable. The great Mother Lode of California has been traced for a distance of 70 miles. In tabular deposits, whether beds or lodes, two dimensions predominate, and the third or smallest dimension, the perpendicular distance between the two bounding planes, is termed the thickness. The adjacent rock on both sides of these two planes is termed the *country;* the portion on which the deposit lies is the *foot-wall*, and that covering it is the *hanging-wall*. With beds or seams, these are known as the *floor* or *roof* respectively. The *strike* of a deposit is the angle formed with the meridian by the direction of a horizontal line drawn in the middle plane, and its *dip* is the inclination downwards measured in degrees from the horizontal. As the dip of lodes is usually considerable, it is sometimes measured from the vertical, and is then termed *underlie* or *hade*. The portion of a mineral deposit occurring at the surface is known as the *outcrop*, *basset*, or (in the United States) *apex*. The contents of lodes vary, some parts containing worthless vein-matter or *gangue*, others being filled with ore. The productive portions are termed *courses*, *bunches*, *shoots* (U.S. *chutes*), or *pipes* of ore. Cross-courses are veins with a direction nearly at right angles to the chief lodes of any particular mining district. Experience shows that the productiveness of lodes is affected by intersection with other veins, by the nature of the adjacent rock, and by changes of dip or of strike.

The origin of mineral veins is a much debated subject which has long occupied the attention of geologists. All the theories which have at various times been brought forward assume in the first place that a fissure has been formed in the earth's crust. This fissure has, it is thought, been filled up by mechanical action causing the attrition of the sides, by sublimation, by injection of molten or plastic material from below, as in the case of dykes of eruptive rock, or, lastly, by depositions from solution, coming from above, from below, or from the sides. The last mentioned, known as the lateral secretion theory, has received great support by the researches of Prof. F. Sandberger. These researches have shown the presence of the common heavy metals in rocks belonging to every geological period. Copper, tin, lead, zinc, cobalt, and nickel have been detected in silicates (mica, augite, and olivine), occurring as component minerals of the commonest rocks. Prof. Sandberger therefore concludes that these metals have been dissolved out and deposited in fissures.

The subject of mineral deposits is systematically treated in J. A. Phillips' *Treatise on Ore-deposits* (Lond. 1884), in which a full bibliography of the subject will be found. The reduction of ores is discussed under METALLURGY, and under the names of the several metals.

Or'egon, one of the Pacific states of the American Union, is in 42°—46° N. lat. and 116° 40′—124° 45′ W. long, and is bounded N. by Washington, E. by Idaho, and S. by California and Nevada. Copyright 1891 in U.S. by J. B. Lippincott Company. Area, 96,030 sq. m., or almost twice that of England. Oregon on the west is literally rock-bound by the Coast Range of mountains, having, however, numerous indentations which furnish good harbours for sea-going vessels. The Columbia River affords the largest and deepest entrance. Seventy miles east of the Coast Range is the Cascade Range, rising to a height of 6000 to 8000 feet, and at almost regular intervals surmounted by snow-capped peaks of nearly double that altitude. From the Cascade Range eastward to the Blue Mountains, about 70 miles, and farther on to the eastern boundary of the state, the surface is diversified by mountains and valleys, rolling plains, and table-lands. Here the soil and climate are suitable for agriculture and grazing. In Western Oregon is the Willamette valley, 130 miles long and 60 miles

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wide, every foot of which is arable and fertile—adapted by soil and climate to grain and fruit. The valley is situated between the Coast Range and the Cascade Range of mountains. South of this are the Umpqua and Rogue River valleys, both of which produce large quantities of fruit.

The climate of Oregon is mild, in spite of its northerly situation, owing first to the oceanic current from Japan, which, starting with a temperature of 90°, is from 49° to 54° off the coast here. Moreover, the cold Arctic winds are warded off by the Cascade Range, and no blizzard can cross the Rocky Mountains. The range of temperature from summer to winter is small. On the coast the climate is mild and varies little, but there is fog in summer and excessive rain in winter; in the Willamette valley the summers are pleasant, the winters wet, and spring and autumn foggy in the mornings; the Umpqua valley has a delightful climate, with some snow in winter; and the same, with greater heat and cold, is true of the Rogue River valley, the lake region in the south-east, and Eastern Oregon, where there is a good deal of snow in winter. The average mean temperature is 50° F., the rainfall 36 inches—17 at Linkville, in the interior, and 59 at Astoria, on the coast.

The grain-crops of Oregon are wheat, oats, barley, rye, and maize, in this order. Flax-seed, hay, potatoes, tobacco, and hops (principally along the rivers Willamette and Mackenzie) are also raised. From three to four million pounds of butter and cheese are produced annually. Great quantities of fruit, both green and dried, are annually shipped from the state, especially from the western districts; but in Eastern Oregon, too, excellent fruit is produced, and, as the bunch-grass is fast disappearing, and the herds of cattle are diminishing, agricultural and horticultural pursuits are receiving more attention. The lands best suited for fruit-farming are mainly limited to the valleys and foot-hills; but these are of vast extent, and the extreme richness of the soil and the mildness of the climate make the state's productive powers almost inconceivably great. The demand abroad for Oregon fruits more than doubled annually from 1885 to 1890. The most successful fruits are the Italian prune, apples (Oregon is called 'the land of red apples'), pears, peaches, grapes, and cherries (the Royal Ann cherries grow too large for one bite). The wealth of Oregon in timber is remarkable. The Oregon Pacific Railroad, in crossing the Cascade Range, passes through a great timber belt extending for 90 continuous miles; and it is stated that careful examination shows in one locality enough timber on one square mile to supply for twenty years a mill cutting 150,000 feet a day.

Among the other industries of Oregon may be mentioned the catching and tinning of salmon (430,000 cases were shipped from the Columbia River in 1890), the rearing of sheep (Eastern Oregon produces large quantities of wool of good quality), and mining. The minerals of the state comprise coal (29,600 tons in 1885), iron ore, gold (14,965 ounces), copper, nickel, quicksilver, fire-clay, chrome, silver, manganese, zinc, lead, and platinum. Trade is facilitated by numerous lines of railway, and the navigable rivers have steamers running all the year. In 1891 there were three through lines connecting Oregon with the east and south, and another was in construction.

Under the title of Oregon was formerly included all the land between the Rocky Mountains and the Pacific Ocean north of 42° N. lat. John Jacob Astor established Astoria (q.v.) in 1811; in 1813 it was sold to the North-western Fur Company, and it afterwards passed into the possession of the Hudson Bay Company. Great Britain's claim to the territory was based on Drake's discovery of the coast in 1579, Cook's visit to Juan de Fuca Strait in 1778, the explorations of Captain John Meares in 1788–89, and Vancouver's survey of the entire coast from 30° to 60° N. lat., and discovery and ascent of the Columbia River, in 1792. A treaty of joint occupation was agreed to between Britain and the United States in 1818, and endured until 1846. Settlement by the New Englanders began in 1832, and an Indian mission was planted at Salem by the Methodists in 1834. The Oregon question was a prominent feature of the presidential contest in 1844. In 1846 the dispute was compromised, the boundary line with British America being fixed at 49° N. lat. Oregon became a territory in 1848, and, with reduced limits, a state in 1859. It has thirty-one counties, and sends one representative to congress. The judges of the supreme court are elected by popular vote. The total value of property in 1890 was $115,000,000. The public school system consists of district schools (1693 organised districts in 1890, with 1499 school-houses and 2566 teachers) free to all between the ages of four and twenty, the state university at Eugene, the state agricultural college at Corvallis, and four normal schools, besides institutions for the blind, deaf and dumb, and orphans. There are also thirty-three private and denominational institutions. The principal cities are Portland, the metropolis (pop., with suburbs, 75,000), Salem, the capital (4515), Astoria and Albany (7000), and Eugene (4000). Pop. of the state (1860) 52,464; (1880) 174,768; (1890) 313,767.

Oregon River. See COLUMBIA.

Orel, a town of Russia, stands on the Oka, 222 miles by rail SSW. of Moscow, has manufactures of ropes, tallow, bricks, machinery, and verdigris, and a busy trade in grain, ropes, and tallow. It was burned down in 1848 and again in 1858. Pop. (1883) 76,601—The *government* of Orel, an agricultural and busy industrial region, has an area of 18,036 sq. m., and a pop. (1883) of 1,918,342.

Orellana. See AMAZON.

Orelli, KASPAR VON, scholar, was born at Zurich, 13th February 1787. Ordained in 1806, he next year became a Reformed preacher at Bergamo; in 1813 a teacher in the cantonal school at Coire; in 1819 professor at Zurich, and in 1833 professor of Classical Philology in the newly-founded university. He died at Zurich, 6th January 1849. Orelli edited many classical authors with great learning, taste, and acute discrimination, in particular Horace (1837–38), Tacitus (1846–47), and Cicero (1826–31). His *Onomasticon Tullianum* (1836–38) and *Inscriptionum Latinarum Selectarum Collectio* (1828) also deserve mention.

Orelli, KONRAD VON, theologian, was born at Zurich, 25th January 1846, and studied at Lausanne, Zurich, Erlangen, and especially theology at Tübingen, and oriental languages at Leipzig. In 1869 he became orphan-house preacher at Zurich, *privat-docent* in 1871, professor extra-ordinary of Theology at Basel in 1873, and ordinary professor there in 1881. Among his writings are *Die Alttestamentliche Weissagung von der Vollendung des Gottesreichs* (1882; Eng. trans. 1885) and admirable Commentaries on Isaiah (1887; trans. 1889), Jeremiah (1887), Ezekiel and the Twelve Minor Prophets (1888).

Orenburg, a town of European Russia, stands on the river Ural, by rail 727 miles ESE. of Moscow. Founded (1743) as a frontier fortress, it is now of importance for its commerce only; it imports cotton, silk-stuffs, cattle, hides, &c. from Bokhara, Khiva, and Tashkent. Corn, metals, sugar, woven goods are the principal exports. The

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town possesses an arsenal and two military schools. Pop. (1882) 42,123.—The *government* has an area of 73,794 sq. m. and a pop. of 1,198,360, of very mixed races, Bashkirs (246,000) and Cossacks (229,000) predominating.

Orense, capital of a Galician province of Spain, near the frontier of Portugal, on the left bank of the Minho, and 60 miles from its mouth. It has hot sulphurous springs, and manufactures woollens, linens, and chocolate. Pop. 13,291.

Oreodaphne, a genus of trees of the natural order Lauraceæ, sometimes called Mountain Laurel. *O. opifera* is a native of the countries on the lower part of the Amazon. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor. *O. cupularis* is a very large tree with strong-scented wood, the bark of which yields the cinnamon of Mauritius. It grows also in Bourbon and Madagascar. *O. fœtens*, a native of the Canaries, has wood (*Til-wood*) of a most disagreeable odour. *O. bullata*, found at the Cape of Good Hope, is also remarkable for the disagreeable odour of its wood, the *Stink-wood* of the colonists; but it is hard, durable, beautiful, takes an excellent polish, and is used in shipbuilding.

Oreodonts, an extinct family of ungulates, the remains of which occur in the Tertiary deposits of North America.

Orestes, son of Agamemnon and Clytæmnestra. When his father was murdered by his mother and her paramour Ægisthus he was saved by his sister Electra, who sent him secretly to Phocis to the court of Strophius, husband of Agamemnon's sister. Here he formed a romantic friendship with the king's son, Pylades, and as soon as he had grown up the pair went secretly to Argos, and slew Clytæmnestra and Ægisthus. Madness seized him after the matricide, and he fled from land to land, ever haunted by the avenging Erinnyes or Furies. At Athens, whither he had fled by advice of Apollo, he was purged of guilt by the Areopagus. Learning from Apollo, according to another story, that he could only recover from his madness by carrying off the statue of Artemis from the Tauric Chersonesus, he journeyed thither along with Pylades, but the friends were seized by the natives to be sacrificed to Artemis. Her priestess Iphigenia recognised her brother in Orestes, and all three escaped together, carrying the statue with them. Orestes recovered his father's kingdom at Mycenæ, slew Neoptolemus, and married his wife Hermione, who had been formerly promised to himself. The story of Orestes afforded a favourite theme to the great tragedians—to Æschylus in the extant trilogy, the *Oresteia: Agamemnon*, *Choephori*, and *Eumenides;* to Sophocles in his *Electra;* to Euripides in his *Orestes* and *Electra*. See Becker, *Die Orestes-sage der Griechen* (Wittenberg, 1858).

Orfila, MATHIEU JOSEPH BONAVENTURE, founder of the science of toxicology, was born at Mahon in Minorca, 24th April 1787, and studied at Valencia, Barcelona, and Paris (whither he was sent by the junta of his province). In October 1811 he received the degree of Doctor of Medicine, and immediately commenced a private course of lectures on chemistry, botany, and anatomy, which was largely attended, and, along with his successful practice, soon rendered him famous. In 1813 appeared the first edition of his celebrated work on poisons, entitled *Traité de Toxicologie Générale* (Paris). In 1819 he was created a citizen of France, and became professor of Jurisprudence; and in 1823 he was transferred to the chair of Chemistry, to which in 1831 was added the deanship of the faculty. On the outbreak of the revolution of 1848 he was deprived of his place in the medical faculty on account of his conservative opinions, but retained his professorship. He died at Paris, March 12, 1853. Other works were on medical chemistry (1817) and on forensic medicine (1825). He also contributed largely to various journals, dictionaries, and encyclopædias.

Orford. See WALPOLE.

Organ (Gr. *organon*, 'an instrument'), a musical instrument played by keys, and generally also by pedals, and consisting of metal and wood pipes, which sound by wind stored in bellows, and admitted into them at will. The following description is necessarily restricted to the most fundamental arrangements of this very complicated instrument. As met with in cathedrals and large churches, the organ comprises four or sometimes five departments, each in most respects a separate instrument with its own mechanism, called respectively the *great-organ*, the *choir-organ*, the *swell-organ*, the *pedal-organ*, and sometimes the *solo-organ*. Each has its own keyboard, but the different keyboards are brought into juxtaposition, so as to be under the control of one performer. Keyboards played by the hands are called *manuals;* by the feet, *pedals*. Three manuals, belonging to the choir, great, and swell organs respectively, rise above each other like steps in front of the performer, while the pedals by which the pedal-organ is played are placed on a level with his feet. The condensed air supplied by the *bellows* is conveyed through a *wind-trunk* into a *wind-chest*. Each department of the organ, it may be mentioned, has its wind-chest. Attached to the upper part of the wind-chest is the *upper board*, an ingenious contrivance for conveying the wind at pleasure to any individual pipe, or pipes, exclusively of the rest. In the upper board are set the *pipes*, of which a number of different quality, ranged behind each other, belong to each note. Beneath the upper board is a row of parallel *grooves*, running horizontally backwards, corresponding each to one of the keys of the instrument. On any of the keys being pressed down, a valve is opened which supplies wind to the groove belonging to it. The various pipes of each key stand in a line directly above its groove, and the upper surface of the groove is perforated with holes bored upwards to them. Were this the whole mechanism of the sound-board the wind on entering any groove would penetrate all the pipes of that groove; there is, however, in the upper board another series of horizontal grooves at right angles to those beneath, supplied with *cross-slides*, which can be drawn out or pushed in at pleasure by a mechanism worked by the *draw-stops* placed within the player's reach. Each slide is perforated with holes, which, when it is drawn out, complete the communication between the wind-chest and the pipes: the communication with the pipes immediately above any slide being, on the other hand, closed up when the slide is pushed in. The pipes above each slide form a continuous set of one particular quality, and each set of pipes is called a *stop*. Each department of the organ is supplied with a number of stops, producing sounds of different quality. The *great-organ*, some of whose pipes appear as show-pipes in front of the instrument, contains the main body and force of the organ. Behind it stands the *choir-organ*, whose tones are less powerful, and more fitted to accompany the voice. Above the choir-organ is the *swell-organ*, whose pipes are enclosed in a wooden box with a front of louvre-boards like Venetian blinds, which may be made to open and shut by a pedal, with a view of producing *crescendo* and *diminuendo* effects. The *pedal-organ* is sometimes placed in an entire state behind the choir-organ, and sometimes divided and

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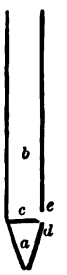
a part arranged on each side. The most usual compass of the manuals is from C on the second line below the bass staff to F above the third ledger line over the treble staff; and the compass of the pedals is from the same C to the F between the bass and treble staves—i.e. two octaves and a half. The real compass of notes is, as will be seen, much greater.

Organ-pipes vary much in form and material, but belong to two great classes, known as *flue-pipes* and *reed-pipes*. A section of one of the former is represented in the figure. Its essential parts are the *foot a*, the *body b*, and a flat plate *c*, called the *language*, extending nearly across the pipe at the point of junction of foot and body. There is an opening, *de*, in the pipe, at the spot where the language is discontinuous. The wind admitted into the foot rushes through the narrow slit at *d*, and, in impinging against *e*, imparts a vibratory motion to the column of air in the pipe, the result of which is a musical note, dependent for its pitch on the length of that column of air, and consequently on the length of the body of the pipe: by doubling the length of the pipe we obtain a note of half the pitch, or lower by an octave. Such is the general principle of all flue-pipes, whether of wood or of metal, subject to considerable diversities of detail. Metal pipes have generally a cylindrical section, wooden pipes a square or oblong section. A flue-pipe may be stopped at the upper end by a plug called a *tompion*, the effect of which is to lower the pitch an octave, the vibrating column of air being doubled in length, as it has to traverse the pipe twice before making its exit. Pipes are sometimes half-stopped, having a kind of chimney at the top. The *reed-pipe* consists of a reed placed inside a metallic pipe. This *reed* is a tube of metal, with the front part cut away, and a tongue or spring put in its place. The lower end of the tongue is free, the upper end attached to the top of the reed; by the admission of air into the pipe the tongue is made to vibrate, and, in striking either the edge of the reed or the air, produces a musical note, dependent for its pitch on the length of the tongue, its quality being determined to a great extent by the length and form of the pipe or bell within which the reed is placed. When the vibrating tongue does not strike the edge of the reed, but the air, we have what is called the *free reed*, similar to what is in use in the Harmonium (q.v.). To describe the pitch of an organ-pipe terms are used derived from the standard length of an open flue-pipe of that pitch. The largest pipe in use is the 32-feet C, which is an octave below the lowest C of the modern pianoforte. There is, however, now in the new Sydney organ a pedal stop 64-feet tone. By a 32-feet or 16-feet stop we mean one whose lowest note is produced by a pipe 32 feet or 16 feet in length.



The *stops* of an organ do not always produce the note properly belonging to the key struck; sometimes they give a note an octave, or, in the pedal-organ, even two octaves lower, and sometimes one of the harmonics higher in pitch. *Compound* or *mixture stops* have several pipes to each key, corresponding to the different harmonics of the ground-tone. There is an endless variety in the number and kinds of stops in different organs; some are, and some are not continued through the whole range of manual or pedal. Some of the more important stops are called *open* or *stopped diapason* (a term which implies that they extend throughout the whole compass of the keyboard). The stops on an organ are principally of 8 feet in the manuals. The *dulciana* is an 8-feet manual stop, of small diameter, so called from the sweetness of its tone. Among the reed-stops are the *clarion*, *oboe*, *bassoon*, *vox humana*, *trumpet* or *posaune*, and *trombone* or *ophicleide*, deriving their names from real or fancied resemblances to these instruments and to the human voice. Of the compound-stops the most prevalent in Britain is the *sesquialtera*—more frequently called *mixture*—consisting of three to five ranks of open metal pipes, often a 17th, 19th, 22d, 26th, and 29th from the ground-tone. The resources of the organ are further increased by appliances called *couplers*, by which a second manual and its stops can be brought into play, or the same manual can be united to itself in the octave below or above.

Organs are now generally tuned on the equal temperament (see TEMPERAMENT). The notation for the organ is in three staves, consisting of a treble and two bass clefs; but in old compositions the soprano, tenor, and alto clefs are used.

The organs used in antiquity were principally water-organs. Large water-organs were employed to accompany the performances at the Roman theatres, and similar instruments were to be found in the hippodromes of Constantinople. The scope of the instrument was therefore originally secular, and one of the earliest patrons of the organ was the Emperor Nero. Ctesibius of Alexandria must be credited with the invention of the organ. Taking the idea from a peculiar sort of clepsydra or water-clock which he had invented, and one function of which was to tell the hours of the night by musical notes, he worked onwards from invention to invention until he constructed the earliest water-organs. The instruments shown to Nero and the first organs ever seen in Rome were from the designs of Ctesibius. The water mechanism in the 'water-organs' was connected solely with the blowing, and seems to have been insisted on so strongly by the early organ-builders in order to render that operation equable and steady. By means of pistons working in cylinders the wind was pumped through water into the wind-chest, where were set the pipes, furnished on the bottom with slides, which were connected with iron keys by strings or trackers. Such was the main difference between the water-organ and the wind-organ. The water-organ became the rage of Rome and increased in favour as the empire hastened to its decline. In the reign of Honorius (400 A.D.) no nobleman's house was considered complete without its organ, and portable water-organs were made in great numbers which could be carried by slaves from house to house, where concerts or musical gatherings were attended by their masters. After the overthrow of the western empire organ-building seems to have been lost, among other useful arts, under the influence of the barbarian inroads. Constantinople, however, remained what it had always been, the great home of organ-building in the ancient world. The magnificence of the organs in the Golden Hippodrome is spoken of with enthusiasm by the Byzantine historians. An organ which was brought by certain Byzantine ambassadors on a mission to Charlemagne is said to have served as a model for the first organ ever built in mediæval Europe, constructed by the orders of that emperor according to the Greek pattern. From Aix-la-Chapelle the use of organs spread throughout Charlemagne's empire, and this instrument served as a model for the rest.

The application of bellows to the organ was known in the days of the later Roman emperors. On the obelisk of Theodosius we have a delineation of an organ blown solely by bellows. Probably the invention of the bellows mechanism dates from the time of the Emperor Julian. Yet this great secret of organ-building was rarely if ever acted upon; and until the end of the 9th century, when Germany had become the centre of organ-building,

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water-organs were the almost exclusive form of organ employed both in Europe and the East. Towards the end of the 9th century large bellows organs began to be built, in keeping with the large Romanesque churches of the times. Thirty bellows were employed in some of these organs; the outstretched arms of the organist could not span the compass of an octave; and the player or players struck each key with their fist. In the monasteries meanwhile, where size was not so much in demand, the mechanism of the organ was marvellously elaborated. The complete furnishings of the organ parts were manufactured in the monasteries, even down to the smelting of the metals whereof the pipes were made. Those diminutive organs, called regals, so small that they could be held on the palm of the hand, were the outcome of monastic ingenuity, and Pope Sylvester II. was a warm patron of organ-building, and himself no mean inventor in the art.

The family of the Antignati, in Brescia, had a great name as organ-builders in the 15th and 16th centuries. The organs of England were once in high repute, but the puritanism of the Civil War doomed most of them to destruction; and when they had to be replaced after the Restoration it was found that there was no longer a sufficiency of builders in the country. Foreign organ-builders were therefore invited to settle in England, the most remarkable of whom were Bernhard Schmidt (generally called Father Smith), his nephews, and Renatus Harris. Christopher Schreider, Snetzler, and Byfield succeeded them; and, at a later period, Green and Avery, some of whose organs have never been surpassed in tone. The largest English organs are those of the Royal Albert Hall, St Paul's Cathedral, the Alexandra Palace, the Crystal Palace, St George's Hall, Liverpool, and the Leeds Town-hall. The German organs are remarkable for preserving the balance of power well among the various masses, but in mechanical contrivance they are surpassed by those of England.

The largest organ in the world is usually said to be that in the cathedral of Seville, which is stated to have 110 stops and 5300 pipes. There are several organs in that cathedral, and this immense organ is said to exceed them all considerably in size. The method of blowing it is peculiar: a man walks up and down a long planking, arranged like the familiar 'see-saw,' the motion of which fills the bellows. Since, however, there is a conflict of testimony as to the Seville organ, and no certain indication of its magnitude can be gathered except by reports upon hearsay, the superiority in point of size among the organs of Europe is usually conceded to the Dutch organs. The organ in the cathedral of St Lawrence at Rotterdam is an immense structure, containing a great organ with 18 stops, a choir with 15, a positive with 18, an echo with 8, and a pedal-organ with 16 stops. These, along with 11 accessory stops, make up a total of 86 stops. The organ at the cathedral of St Bavon at Haarlem was long celebrated as the largest in the world. It took three and a half years to build, and cost £10,000. It possesses 4088 pipes and 60 stops, exclusive of accessory stops. The organ of the Protestant Church in Utrecht has 59 stops, including the accessory ones; that in the Octagon Church at Rotterdam possesses a total complement of 52 stops. St Peter's at Rome has four smallish organs, the largest of which has only 2 manuals and pedal, and 27 stops in all, thus divided—great, 17; swell, 6; pedal, 4. The second largest organ in St Peter's has but 1 manual and pedal. Generally speaking, the Italian organs are much inferior in point of size to those of the northern nations.

Up till the middle of the nineteenth century, little interest was taken in organ-building in America. The erection of the great organ in the Music Hall, Boston, by a German builder, Walcker of Würtemberg, gave the first impetus to public interest in the matter. Roosevelt of New York, and Jardine, likewise of New York, are two of the best-known organ-builders in America at the present time. Roosevelt has invented 'the automatic adjustable combination,' which enables the player to place any required combination of stops under immediate control, and to alter such combinations as frequently as desired. By his construction of the wind-chest, also, each pipe has its own valve, actuated by compressed air. Among the largest organs in America are the organs of the Roman Catholic Cathedral, Montreal, the cathedral of the Holy Cross, Boston, which possesses 83 stops; the Music Hall, Cincinnati, with 96 stops and 4 manuals, and the Tremart Temple, Boston, with 65 stops.

For the structure of the organ, see Hopkins and Rimbault, *The Organ* (Lond. 1855). For the history of the organ, see Rowbotham's *History of Music*, vol. iii. chaps. 3, 6; and book iv. chap. 2 (Lond. 1887). For organ-playing, see Archer's *Practical Organ Tutor*, Best's *School for the Organ*, Stainer's *The Organ*. There are also works on the organ by Warman (1882–87) and Audsley (1889), and a very full organ bibliography in *Notes and Queries* for 1890. The American organ is discussed at HARMONIUM; and BARREL-ORGAN is a separate article.

Organ, Organic, Organism, terms derived form the Greek *organon*, 'an instrument,' and still retaining in some of their applications that significance. But the words have found special acceptance in connection with the forms of life; Linnæus described these, whether animals or plants, as *Organisata;* and we constantly speak of them as organisms, of their larger, well-defined, and integrated parts as organs, of their internal activity and its products as organic. Prior to the year 1828 it was believed that certain chemical compounds which were produced as the results of vital processes occurring within the tissues of animal and vegetable organisms could not be obtained by the ordinary methods of the chemical laboratory; and these compounds were, for this reason, designated as organic. Wöhler in that year, however, discovered that urea, the most important solid constituent of urine, could be obtained 'artificially,' as it has been called, from inorganic materials. Since that date a very large number of so-called organic compounds have been prepared artificially, so that the original signification of the term 'organic' does not hold any longer; and the old conception of an organism as an engine-like collection of organs with fixed functions is disappearing before the doctrine that it is the protoplasm or living stuff in all parts of the body that is the basis of all vital activities. The title of organic chemistry is now commonly applied to the chemistry of the compounds of carbon, whether these compounds are obtainable only as the products of vital processes or not; see the articles CHEMISTRY and ANALYSIS (ORGANIC). Organic impurities in water are those due to animalcules, bacteria, and decomposing organisms; while such phrases as 'organic disease,' 'organic connection,' refer to the relation between a living organism and its parts. See BIOLOGY, FUNCTION, MORPHOLOGY, PHYSIOLOGY.—For organic bases, see ALKALOIDS; for organic radicals, see RADICAL.

Organo-metallic Bodies. Under this term are included a large number of chemical compounds in which organic radicals, such as methyl, CH_3, ethyl, C_2H_5, &c., are united to metals. Amongst the earliest obtained of these substances were those derived from the metal zinc. Zinc-methyl, $Zn(CH_3)_2$, and zinc-ethyl, $Zn(C_2H_5)_2$, which may be taken as examples of the class, are colourless liquids, heavier than water, which boil at 46° and

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118° C. respectively. They take fire spontaneously in contact with air, and burn with the production of a dense white smoke of oxide of zinc. In contact with the skin they give rise to severe wounds which are very difficult to heal. They are decomposed with great energy by water. Substances analogous to these zinc compounds have been prepared, containing cadmium, magnesium, antimony, arsenic, bismuth, tin, aluminium, mercury, lead, sodium, potassium, and some rare metals.

For further information on this subject, see an article by Dr Frankland, in the 13th vol. of the *Quarterly Jour. of the Chemical Soc.*; also the article on 'Organometallic Bodies' in Watt's *Dict. of Chemistry*; or any of the larger recent text-books of organic chemistry.

Organzine. See SILK.

Orgies, secret rites or customs connected with the worship of some of the pagan deities; as the secret worship of Demeter, and the festival of Dionysus, which was accompanied with many customs of mystic symbolism, and much license. From this latter accident comes obviously the modern sense of drunkenness and debauchery implied in the word. See MYSTERIES.

Oribasius, a Greek medical author, and physician to Julian the Apostate (326–403 A.D.). He was born at Pergamus or Sardis, and his works are largely compilations from Galen (see MEDICINE, p. 117). There is an edition of his works in 6 vols. by Buffemaker and Daremberg (Paris, 1852–76).

Oriel Movement. See KEBLE, NEWMAN.

Oriel Window, a projecting window in an upper story, supported on corbels, having more sides than one, usually three, and commonly divided into bays by mullions. It is one of the most picturesque features in mediæval and Elizabethan domestic architecture, and adds much to the convenience of the interior. The word oriel (Mid. Lat. *oriolum*, probably dim. from *os, oris*, as if a small opening or recess) formerly meant a chamber or apartment, and a window is so called which makes, as it were, a small apartment off a large room. By old writers oriels are called Bay Windows (q.v.).

Orientation, in Architecture, is the position of a church so that its chancel shall point towards the east. This was a fashion invariably adopted in northern countries, but not adhered to in Italy and the south. St Peter's at Rome, for example, has the choir to the *west*, and the principal entrance towards the east. The orientation of churches is not usually very exactly to the east, and it is supposed that the east end in some cases has been set so as to point towards the place where the sun rises on the morning of the patron saint's day. In other cases the choir and nave are not built exactly in a straight line, the choir having thus a slight inclination to one side, which in the symbolism of the middle ages was supposed to indicate the bowing of our Saviour's head upon the cross. This departure from the line of the true east, however, in many instances arose more probably from carelessness or ignorance.

Oriflamme, the red silk banner first of the Abbey of St Denis, and afterwards of France, was so called because it was a flag (*flamme*) borne on a gilded (*or* = 'gold') staff. See FLAG.

Origen, the most learned and original of the early church fathers, and perhaps the noblest figure amongst them all, was born, probably at Alexandria, in 185 or 186. His full name was Origenes Adamantius. He was the son of the Christian martyr Leonidas, who was beheaded under Severus in 202. 'Origen was great even from his cradle,' says Jerome. In the early years when he was instructed by his father, Eusebius tells us, 'the simple and easy meanings of the sacred Scriptures were not enough for him, but he sought something deeper,' and Leonidas would often bend over his son's bed as he lay asleep and kiss his breast, 'which the Spirit of God had made His temple.' In the catechetical school of Clement he formed the friendship of Alexander, afterwards Bishop of Jerusalem. He encouraged his father to martyrdom, and his purpose of joining him in this was only frustrated by the artifice of his mother, who concealed all his clothes. After his father's death he supported his mother and six brothers by teaching 'grammar,' and from his eighteenth year he acted, with the consent of his bishop Demetrius, as master of the catechetical school. A collection of classical books which he had bought or copied out for himself he sold for a sum which yielded him four obols (or about 6d.) a day, which sufficed for his simple wants for many years. According to Eusebius he went so far in his asceticism as to mutilate himself, following a literal interpretation of Matthew, xix. 12, but by some this is doubted. His intercourse with heretics and educated heathens led him to devote himself to more thorough study of Plato, the later Platonists and Pythagoreans, and the Stoics, under the guidance of the Neoplatonist Ammonius Saccas. At Alexandria he taught for twenty-eight years (204–232), composed the chief of his dogmatic treatises, and commenced his great works of textual and exegetical criticism. The labours of those years were interrupted by journeys to Rome, Arabia, Antioch, and other places. During a visit to Palestine in 216 the bishops Alexander of Jerusalem and Theoctistus of Cæsarea had employed him to deliver public lectures in the churches, and on a later occasion (in 230) had consecrated him as a presbyter without referring to his own bishop. A synod held at Alexandria under Demetrius forbade him to teach in that city, and a second Alexandrian synod (consisting of bishops only) deprived him of the office of presbyter. The churches of Palestine, Phœnicia, Arabia, and Achaea declined, however, to concur in this sentence. Origen then settled at Cæsarea in Palestine, which was his chief home for twenty years. He there founded a school which afforded its disciples a thorough training in literature, philosophy, and theology. Among their number were Gregory Thaumaturgus and Firmilian of the Cappadocian Cæsarea. In the latter city Origen took refuge for two years during the Maximinian persecution. In the last twenty years of his life he made many other journeys. In the Decian persecution he was arrested at Tyre and cruelly tortured. He died there in 253 or 254.

Origen was a most voluminous writer. 'Which of us,' asks Jerome, 'can read all that he has written?' Yet the statement of Epiphanius that his works numbered 6000 is doubtless exaggerated. His exegetical writings extended over nearly the whole of the Old and New Testaments, and included *Scholia* (short notes), *Homilies*, and *Commentaries*. Of the Homilies only a small part has been preserved in the original, much, however, in the Latin translations by Rufinus and by Jerome; but unfortunately these cannot be relied upon, for the translators thought fit to modify and tamper with them. Of the Commentaries a number of books on Matthew and on John are extant in Greek, those on John of great value for the study of his speculative theology. Origen's gigantic *Hexapla*, the real foundation of the textual criticism of the Scriptures, was too large to be preserved entire. The remains of its text of the Septuagint were collected by Bern. de Montfaucon (2 vols. fol. Paris, 1713) and Field (2 vols. Oxford, 1875). His *Eight Books* against Celsus (q.v.), written in his old age, are preserved entire in the original Greek. This, the greatest of early Christian apologies, effectively appeals

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to the Christian life as the most convincing proof of the Christian faith. The speculative theology of Origen is presented in his four books *Peri Archōn*, extant as a whole only in the somewhat garbled Latin translation of Rufinus. It is a bold attempt to evolve from the church's rule of faith, with the help of Scripture and reason, a science of Christian faith. Two books *On the Resurrection* and ten books of *Stromata* (in which he proved all the Christian dogmas by quotations from the philosophers) are lost. The eclectic philosophy of Origen bears the distinctive stamp of Neoplatonist and Stoic theories. God alone has being in the proper sense. It is essential to the Deity to will, work, and reveal Himself unchangeably and eternally. In the Logos, proceeding by eternal generation from God, and of the same substance with Him, all creative ideas are concentrated. He is the link between the oneness of Deity and the multiplicity of the world. All finite being is good only as it has part in the Divine. All created spirits are free. Their fall led to the creation of the material world, that in forms more or less material (*soul* and *body*) the renewing discipline of the *spirit* within might be realised. The idea of the procession of all spirits from God, their fall, their redemption, and return to God lies at the foundation of the whole development of the world, at the centre of which is the incarnation of the Logos for the revelation of redeeming truth and the union of divine forces with humanity. Origen's system is an elaborate web, of which Greek metaphysics is the warp, the gospel history the woof. All that was true in Greek philosophy Origen held to be traceable to the general revealing agency of the Logos, who in Christianity alone is fully and expressly manifested. The proper source of the knowledge of the Christian faith is the Word of Christ (i.e. the Scriptures). A living faith in those truths of Scripture which have been handed down as fundamental by the church's succession of bishops is itself sufficient for salvation. Beyond such 'unreasoning faith' there is the 'knowledge' or 'wisdom' which rises to the free love of God, and leaves behind it the historical contents of the church's teaching, which have served to it as the media of spiritual ideas in its progress from practical faith to the vision of God and likeness to Him. It is by entering more deeply into the successive senses of Scripture that this process is carried out. Scripture admits of a threefold interpretation, in correspondence to the tripartite nature of man. The 'bodily' (literal or historical) sense is always to be retained, except where it is unworthy of God or contradictory to reason; for God has intended such passages to be 'stumbling-blocks,' suggesting the necessity of seeking a deeper meaning. The *Psychical* (or ethical signification) is next; and beyond it is the *Pneumatic* (allegorical or mystical) sense.

Unhappily for the memory of Origen, his name was chiefly remembered in connection with the most erroneous part of his work. His fanciful method of interpretation was perpetuated alike in the east and the west, and the fruits of his gigantic labours were appropriated by orthodox theologians, who branded him as a heretic, and doubted of his salvation. Long after his death malignant falsehoods were heaped upon his name by unscrupulous enemies like Theophilus of Alexandria; and not merely the heresy of maintaining the ultimate restitution of all mankind, but even heresy respecting the nature of Christ was triumphantly discovered in his writings. Yet, heterodox though he was, not one amongst those honoured by the church as saints surpasses him in saintliness or spiritual elevation of character. 'His whole life,' says Bishop Westcott, 'from first to last was fashioned on the same type. It was, according to his own grand ideal, "one unbroken prayer," one ceaseless effort after close fellowship with the Unseen and the Eternal. No distractions diverted him from the pursuit of divine wisdom. No persecution checked for more than the briefest space the energy of his efforts. He endured a double martyrdom: perils and sufferings from the heathen, reproaches and wrongs from Christians; and the retrospect of what he had borne only stirred within him a humbler sense of his shortcomings.'

There is as yet no complete critical edition of Origen's works; the best apology for this is that of the uncle and nephew, De La Rue (4 vols. folio, Paris, 1733–59), reprinted by Lommatzsch (25 vols. Berlin, 1831–48), and by Migne, *Patrol. Curs. Compl.*, ser. Gr., vols. xi.–xvii. The Prolegomena to a critical edition by Dr Ph. P. Koetschau of the work against Celsus appeared in 1890. The work of P. D. Huet, *Origenis in sacras Scripturas Commentaria quæcunque Græce reperiri potuerunt* (2 vols. Rothomagi, 1668), was the foundation of the critical study of Origen. For an account of his theological opinions and the great controversies that these originated, see the works on church history by Baur, Neander, Dorner, Böhringer, Schaff, and E. de Pressensé; also E. W. Möller, *Geschichte des Kosmologie in der Griechischen Kirche bis auf Origenes* (Halle, 1860); Kahnis, *Die Lehre vom Heiliyen Geist* (1847); and the following special books: Thomasius, *Origenes* (Nürnberg, 1837); Moehler, *Patrologie* (Regensb. 1840); and especially Redepenning, *Origenes, eine Darstellung seines Lebens und seiner Lehre* (2 vols. Bonn, 1841–46). See also Joly, *Étude sur Origène* (Dijon, 1860); Freppel, *Origène* (Paris, 1868); J. Denis, *La Philosophie d'Origène* (Paris, 1884); as also Harnack's *Dogmengeschichte* (2d ed. 1888) and Farrar's *Lives of the Fathers* (1889).

Original Sin. See SIN.

Orihuela (the *Auriwelah* of the Moors), a town in the Spanish province of Alicante, on the Segura, 38 miles N. of Cartagena. Situated in a plain of great beauty and fertility, it offers an eastern aspect with its palm-trees, towers, and domes, and has a cathedral, a college, and manufactures of silk, linen, hats, &c. Pop. 20,929.

Orinoco, one of the great rivers of South America, has its origin on the slopes of the Sierra Parima, in the extreme south-east of Venezuela; its exact sources were only discovered in 1886 by M. Chaffanjon. It flows at first west by north, a mountain-stream, as far as 67° W. long. A little below Esmeralda (65° 50′ W. long.) it divides and sends off to the south an arm, the Cassiquiare, which, after a course of 180 miles, enters the Rio Negro, a tributary of the Amazon. The other branch on reaching San Fernando (68° 10′ long. and 4° 2′ N. lat.) is met by the strong current of the Guaviare; the united stream then turns due north, and, after passing over the magnificent cataracts of Maypures and Atures (glowingly described by Humboldt), and picking up the Meta on the left, meets the Apure, which likewise strikes it from the left. Below the confluence with the Apure the Orinoco turns east and traverses the llanos of Venezuela, its waters, with an average breadth of 4 miles, being augmented from the right by the Caura and the Caroni. About 120 miles from the Atlantic, into which it rolls its milk-white flood, its delta (8500 sq. m.) begins. Of the numerous mouths which reach the ocean over 165 miles of coast-line only seven are navigable. The waterway principally used by ocean-going vessels, which penetrate up to Ciudad Bolivar (Angostura), a distance of 240 miles, is the Boca de Navios, varying in width from 3¾ to 23 miles. The total length of the river is some 1550 miles, of which 900, up to the cataracts of Atures, are navigable, besides a farther stretch of 500 miles above the cataracts of Maypures; area of drainage basin, 368,600 sq. m. Most of the larger affluents are also navigable for considerable distances, the

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Meta, for instance, to within 60 miles of Bogotá, the capital of Colombia. As a rule the river floods the districts adjoining its banks from May to January, the country under water sometimes measuring 100 miles across.

See A. von Humboldt and Bonpland, *Voyage au Nouveau Continent*, vol. ii.; Sir Robert Schomburgk, *Reizen in Guiana* (1841); Michelina y Rojas, *Exploracion Oficial* (Brussels, 1867); and Chaffanjon, *Comptes Rendus* of Paris Geog. Soc. (1887).

Oriole, a genus (Oriolus) and family (Oriolidæ) of Passerine birds, confined entirely to the Old World, and characteristic of the Oriental and Ethiopian regions. The members of the family are generally of a bright yellow or golden colour, which is well set off by the black of the wings. Twenty-four species are enumerated under the genus. The best known is the Golden Oriole (*O. galbula*). The adult male is about 9 inches long. Its general colour is a rich golden yellow; the bill is dull orange-red; a black streak reaches from its base to the eye; the iris is blood-red; the wings are black, marked here and there with yellow, and a patch of yellow forms a conspicuous wing-spot; the two middle feathers of the tail are black, inclining to olive at the base, the very tips yellow, the base half of the others black, the other half yellow; legs, feet, and claws dark brown. The female is less yellow than the male, and the under parts are streaked with gray. This bird is somewhat rare in England, but it is an annual spring migrant to Cornwall and the Scilly Isles, and it has been found nesting in the south-eastern counties. In Scotland, especially in the southern districts, it has been reported several times; in Ireland it is more rare. In central and southern Europe it is common in summer in certain localities; it is abundant in Persia, and ranges eastwards through central Asia as far as to Irkutsk. It winters in South Africa, where it is found at the Cape, Damaraland, Natal, and Madagascar. In habit it is an unobtrusive bird, fond of the shade of woods, groves, and small ravines, and, although generally accounted very shy, it may be found building its nest in avenues in towns. Its food consists of insects and their larvæ, especially green caterpillars, and fruits such as currants, cherries, and mulberries. The song of the male is short, loud, clear, and flute-like; he has also a mewing call-note, and a harsh alarm-note. The nest is unlike any other European bird's; it is placed in, and suspended from, a fork in a horizontal branch, sometimes of an oak, usually of a pine, in a shady grove or thick wood, and is made of bark, wool, and grass. The eggs number four or five, and are of a glossy, white colour, blotched with reddish purple. Other orioles are distinguished by having black on the head and nape. *O. kundoo* partly replaces the golden oriole in Turkestan, and extends eastwards to India. *O. auratus*, found in Africa between the Sahara and the equator, and *O. notatus*, found throughout south tropical Africa, have the lesser wing-coverts yellow, not black as in the European and Indian birds. The birds called 'Orioles' in the United States belong to an entirely different family, the Icteridæ. See BALTIMORE BIRD.

Golden Oriole (*Oriolus galbula*).

Ori'on, in Greek Mythology, an unusually handsome giant and hunter, the son of Hyrieus of Hyria, in Bœotia. At Chios he fell in love with Merope, daughter of Œnopion, but for an attempted outrage upon the maiden his eyes were put out by Dionysus. Orion recovered his sight by exposing his eyeballs to the rays of the rising sun, and afterwards hunted in company with Artemis. The cause and manner of his death are differently related. Some make Artemis slay him with an arrow, because Eos, enamoured of his beauty, had carried him off to Ortygia, and thereby offended the gods. Others say that Artemis, virgin-goddess though she was, cherished an affection for him that enraged her brother Apollo. One day pointing out to her at sea a black object floating in the water, he told her that he did not believe she could hit it. She took aim and hit the mark, which was the head of her lover swimming in the sea. A third myth makes him find his death from the sting of a scorpion. Æsculapius wished to restore him to life, but was slain by a bolt from Zeus. After his death Orion was placed with his hound among the stars, where to this day the most splendid of the constellations bears his name.

Orissa, an ancient kingdom of India, the authentic history of which goes back for probably more than one thousand years, extended from Bengal on the N. to the Godavari on the S. The present province is the extreme south-west portion of Bengal; on the E. it has the Bay of Bengal, and on the W. the Central Provinces. Orissa was long a Buddhist stronghold; in 474 a new dynasty made it Brahmanical, and introduced the worship of Siva; in 1132 this was replaced by Vishnuism and another dynasty. It ceased to be an independent state in 1568, being conquered and made an outlying province of the empire of the Great Mogul. Its next masters were the Mahrattas, who seized it in 1742; but they were forced to surrender it to the English in 1803. At the present time Orissa is divided between the British commissionership of Orissa and the tributary states, and is accounted part of Bengal Presidency. The commissionership has an area of 9053 sq. m. and a pop. of (1881) 3,730,735; the tributary states, a hilly country with dense jungle, lying between the low coast districts and the interior plateau, has an area of 15,187 sq. m. and a pop. (1881) of 1,469,142. All this region was visited by severe famine in 1868–69. The principal river is the Mahanadi, and the chief towns Cuttack, Balasor, and Puri (Juggernaut, q.v.). The entire district is sacred ground to the Hindus; evidences of the worship of Siva and Vishnu meet the eye at every turn. Great festivals are held in honour of this latter god and of his image called Juggernaut (q.v.). The most interesting of the aboriginal races are the Kandhs (Kondhs, Khonds), who number 280,000, besides close upon 150,000 in the Central Provinces. Amongst these people agriculture and war are the only employments, the menial offices of village life being performed by a subject, almost slave race. They pay profound reverence to the earth-god, and used to sacrifice human beings to secure his favour, until the practice was suppressed by the British (1837–50). The tribal government is strictly patriarchal. The tribesmen were summoned to arms by messengers bearing an arrow, who sped from glen to glen, like the bearers of the fiery cross in Scotland. Duelling was formerly in vogue. The irrigation of a large portion of Orissa is provided for by an extensive and costly system of canals, taken over by the government in 1868.

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See 'An Account of the Religion of the Khonds in Orissa,' in *Trans. Asiatic Soc.* (1851); Campbell's *Personal Narrative of Service amongst the Wild Tribes of Khondistan* (1864); *Calcutta Review*, Nos. IX., XI., XV., and XX.; and *Orissa*, by W. W. Hunter (1872).

Oriza'ba, capital of the Mexican state of Vera Cruz, 82 miles WSW. of Vera Cruz City, and 181 ESE. of Mexico, lies in a fertile garden country, 4030 feet above the sea, and contains an extensive cotton-factory, paper and corn mills, and railway-shops. Pop. 12,500.—The *volcano* of Orizaba, 25 miles to the north, is a noble pyramid rising to an elevation of 17,876 feet, or, according to Heilprin's measurements (1890), 18,205 feet. Its last severe eruption was in 1566.

Orkney Islands, a group of ninety Scotch islands, islets, and skerries, of which only twenty-eight are inhabited, and which have an aggregate area of 376 sq. m., the largest being Pomona or Mainland (207 sq. m.), Hoy (53), Sanday (26), Westray, South Ronaldshay, Rousay, Stronsay, Eday, Shapinshay, Burray, Flotta, &c. They extend 50 miles north-north-eastward, and are separated from Caithness by the Pentland Firth, 6½ miles wide at the narrowest. With the exception only of Hoy (q.v.), which has fine cliffs, and in the Ward Hill attains 1564 feet, the scenery is generally tame, the surface low and treeless, with many fresh-water lochs. The prevailing formation is the Old Red Sandstone, with a small granitic district near Stromness; and the soil is mostly shallow, incumbent on peat or moss. The mean annual temperature is 45°, the rainfall 34·3 inches. The area under cultivation has more than doubled since 1850, but is still less than one-half of the total area. The live-stock during the same period has trebled. The holdings are small—16½ acres on an average; and agriculture and fishing are the principal industries. Kirkwall and Stromness, the only towns, are noticed separately, as also are the standing-stones of Stennis and the tumulus of Maeshowe. Orkney unites with Shetland to return one member to parliament, but it was dissevered therefrom as a county by the Local Government (Scotland) Act, 1889. Pop. (1801) 24,445; (1861) 32,395; (1891) 30,438. The Orkneys (Ptolemy's *Orcades*) were gradually wrested by Norse rovers from their Pictish inhabitants; and in 875 Harold Haarfager conquered both them and the Hebrides. They continued subject to the Scandinavian crown—under Norse jarls till 1231, and afterwards under the Earls of Angus and Stratherne and the Sinclairs—till in 1468 they were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. They were never redeemed from this pledge; and in 1590, on James VI.'s marriage with the Danish princess Anne, Denmark formally resigned all claims to the sovereignty of the Orkneys. The present landed proprietors are chiefly of Scotch descent, the islanders generally of mixed Scandinavian and Scotch origin.

See J. R. Tudor's *Orkneys and Shetland* (1883); and Wallace's *Description of the Isles of Orkney* (new ed. 1884). For map, see SHETLAND.

Orleans, a city of France, the capital now of the department of Loiret, and formerly of the old province of Orléannais, which comprised the best part of the present departments of Loiret, Eure-et-Loir, and Loir-et-Cher, with portions of four others. It stands in a fertile plain on the right bank of the Loire, here crossed by a nine-arched bridge (1760), 364 yards long, and by rail is 75 miles SSW. of Paris. Close to it is the Forest of Orleans, covering nearly 150 sq. m., and planted with oaks and other valuable trees. The walls and gates have given place since 1830 to handsome boulevards, but the town as a whole wears a lifeless appearance, and its domestic architecture has much more interest than any of the public edifices. These include the cathedral, destroyed by the Huguenots in 1567, and rebuilt from 1601 onwards by Henry IV. and his three successors; the *Mairie* (1530); and the 15th-century *Musée* (till 1853 the hôtel-de-ville). Noteworthy are the house of Agnes Sorel, Diane de Poitiers, and Joan of Arc, of whom there are three statues—the bronze equestrian one inaugurated in 1855. The commerce is far more important than the industries (of which the chief is market-gardening), Orleans possessing unusual transit facilities by road and railway, river and canal. Pop. (1872) 48,976; (1886) 57,478. The Celtic *Genabum*, where in 52 B.C. the great Gallic rising broke out against Julius Cæsar, Orleans afterwards (about 272 A.D.) was renamed *Civitas Aureliani*, of which the present name is only a corruption. It was besieged by Attila (q.v.) in 451; passed into the hands of the Franks; and was twice plundered by the Northmen (855 and 865). In 1428-29 it was besieged by the English under the Duke of Bedford, but was delivered by Joan of Arc (q.v.), called therefore the Maid of Orleans. Dunois (q.v.) was known as the Bastard of Orleans. The town suffered much in the wars of the Huguenots (q.v.); and in the Franco-German war it again figured prominently, being occupied by the invaders, October 11 to November 9, 1870, and then the headquarters of the great Army of the Loire until its crushing defeat by Prince Frederick-Charles (December 3–5). Orleans was the death-place of the Earl of Salisbury (1429), of Francis II., Mary Stewart's husband (1560), and of the Duke of Guise (1563). See its history by Bimbenet (3 vols. Orleans, 1884-87).

Orleans, DUKES OF. This title has belonged to three distinct dynasties of French princes of the blood. The title was first given in 1392 by Charles VI. to his dissolute brother Louis (1371–1407), who became regent on the king's madness, and was murdered in the streets of Paris at the instigation of the Duke of Burgundy in revenge for his father's death (see Jarry's *Louis de France*, 1890). His successor was his son Charles (1391–1465), the poet. Charles's son Louis succeeded to the throne as Louis XII. in 1498, whereupon the dukedom of Orleans merged in the crown. It was revived in 1626, when Louis XIII. created his ambitious and intriguing brother, Jean Baptiste Gaston (1608–60), Duke of Orleans and Chartres and Count of Blois. He died without male issue, whereupon Louis XIV. at once revived the title in favour of his brother Philippe (1640–1701), the husband of Henrietta, sister of Charles II., and, after her death, of the Princess Charlotte Elizabeth of Bavaria. His daughters married Charles II. of Spain, Victor Amadeus II. of Savoy, and Prince Charles of Lorraine; his son was the regent and debauchee, Philippe (1674–1723), and his great-grandson was the notorious *Égalité*, Louis-Philippe Joseph (1747–93). Égalité's son, Louis-Philippe (1773–1850), bore the title during his exile, and until he became king of the French in 1830. His eldest son, Ferdinand Louis-Philippe Charles Henri (1810-42), took the title, but it was not borne by his son, the Comte de Paris, who in 1883 became the acknowledged head of the Bourbon house of France, his son, Louis Philippe Robert (born 1869), assuming the old ducal title. For the Orleanist party, see BOURBON, FRANCE.

CHARLES, DUKE OF ORLEANS, commonly called Charles d'Orleans, was the eldest son of Louis, Duke of Orleans, and of the high-spirited Valentina Visconti, and was born 26th May 1391. He married in 1406 his cousin Isabella, the widow of Richard II. of England, who brought him scarcely her good-will, but an ample dowry of half a million francs. Three years later she died, leaving him a

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daughter. He took his share in the intestine struggles of the time, in alliance with the infamous Bernard d'Armagnac, and did his best to avenge on the Duke of Burgundy his father's murder. He commanded at Agincourt (October 1415), and there, or shortly after, was taken prisoner and carried to England, where he spent over a quarter of a century in easy imprisonment at Windsor, Pontefract, Ampthill, Wingfield in Suffolk, and the Tower. In his enforced leisure he hunted, hawked, admired the English ladies, and amused himself with turning some hundreds of ballades and rondels, which, conventional and shallow as they are, are easy and graceful in versification, and informed with a musical and tender melancholy that has a singular charm for the reader. His long captivity had made him a martyr to the eyes of Frenchmen—it was one of Joan of Arc's declared intentions to deliver the captive duke, who, she assured her judges, was beloved of God. His imprisonment became ever more irksome to him, but he was at length ransomed in 1440 through the good offices of Philip the Good of Burgundy, son of his father's murderer, and he at once married Philip's niece, Mary of Cleves. But it was soon discovered that there was nothing of the heroic in his temper or capacity, and he quickly sank again into political insignificance. The last third of his life he spent mainly in great dignity and state at his seat at Blois, where he maintained a kind of literary court which was visited by all the elegant poets of that rhyming age. His latest act was a vain attempt to defend the Duke of Brittany from the grasping hand of Louis XI. He died at Amboise, 4th January 1465. His son became Louis XII. of France.

The best edition of the poems of Charles d'Orleans is that of C. d'Héricault in the 'Nouvelle Collection Jannet' (2 vols. Paris, 1874). The *Debate between the Heralds of France and England* is assigned to him by Mr Henry Pyne, its translator and editor; but M. Paul Meyer, in his edition of the French text, has declared against his authorship. See Beaufil's *Étude* (1861); and R. L. Stevenson, in *Familiar Studies of Men and Books* (1882).

JEAN BAPTISTE GASTON, DUKE OF ORLEANS, was the third son of King Henry IV., was born in 1608, and was granted the title in 1626 on his marriage with Marie of Bourbon, Duchess of Montpensier. His wife soon died, leaving one daughter, 'La Grande Mademoiselle.' He troubled France with incessant and bloody but fruitless intrigues against Richelieu, and but for his royal birth would have lost his head like Montmorency, Cinq-Mars, and De Thou. The validity of his marriage with Marguerite of Lorraine was only declared after a long disputation among jurists and theologians. After Richelieu's death a reconciliation was effected between him and the king, and he was appointed lieutenant-general of the kingdom during the minority of Louis XIV. The duke, finding himself impotent in the hands of Mazarin, placed himself at the head of the Fronde, but with his usual selfishness soon threw over his friends and made terms again with the court. After Mazarin's final triumph he was confined to his castle of Blois, where he died, 2d February 1660, leaving three daughters by his second marriage. See his *Mémoires* (Amsterdam, 1683).

PHILIPPE, DUKE OF ORLEANS, regent of France during the minority of Louis XV., was the son of the first Duke Philippe, and the grandson of King Louis XIII., and was born 4th August 1674. He possessed excellent talents, and acquired knowledge with rapidity, but his tutor, Dubois, afterwards cardinal, early demoralised him by ministering to his passions, and, hardly yet grown up, he gave himself up to debauchery. The king compelled him to marry Mademoiselle de Blois, his daughter by Madame de Montespan. The young prince now began to alarm the court by an unsuspected capacity for war, showed courage at Steenkirk and Neerwinden, and commanded with success in Italy and Spain. But his presence in Madrid after his victories was disliked both by Philip V. and by Louis XIV. For some years thereafter he lived in complete exile from the court, spending his time by turns in profligacy, the practice of the fine arts, and the study of chemistry. Louis, having legitimised his sons the Duke of Maine and the Count of Toulouse, appointed the Duke of Orleans president of the regency only and not regent, giving the guardianship of his grandson and heir and the command of the household troops to the Duke of Maine; but this arrangement was set aside at his death (1715), and the Duke of Orleans became sole regent. He was popular, and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the regent's adoption of the schemes of Law led to disastrous results. He favoured an English and anti-Spanish alliance, and Anglomania, or a craze for everything English, was one of the features of his régime. His alliance with England and Holland, formed in 1717, was joined next year by the emperor, and this quadruple alliance succeeded in effecting the downfall of Alberoni and his wildly-ambitious schemes. At the instance of Lord Stair, the English ambassador, he expelled the Pretender from France. He put an end to the parliament of Paris meddling with financial or political affairs, and declared the legitimised sons of Louis XIV. incapable of succeeding to the throne. Dubois now became prime-minister, and ere long Archbishop of Cambrai and cardinal. To appease the Jesuits he sacrificed the Jansenists, compelling the parliament in 1722 to recognise the bull *Unigenitus*. Yet he was faithful to his trust, and the indolent young prince on his coming of age (1723) rewarded him by retaining him in power. But Dubois died in the August of the same year, and four months later, Philippe's frame gave way under the burden of his debaucheries, 2d December 1723. See the works by Piossens (5 vols. 1749) and Capefigue (2 vols. 1838).

LOUIS-PHILIPPE JOSEPH, DUKE OF ORLEANS, the famous *Égalité*, was born April 13, 1747, and succeeded to the title on his father's death in 1785, having been Duke of Chartres since 1752. He possessed good abilities, but early fell into a course of debauchery which he never quitted till the end of his career. In 1769 he married the heiress of the Duke of Penthièvre, and used her immense wealth to advance his political interest. But he was looked upon coldly at court, and still more so after the accession of Louis XVI. (1774), who abhorred his morals, while Marie Antoinette grudged him his wealth and independent position and hated the criticisms of the ring of witty reprobates who clustered round him. He fought at Ushant, but was prevented from further service and promotion to the rank of admiral by the jealousy of the court. He visited London frequently, became an intimate friend of the dissipated young Prince of Wales, afterwards inglorious as George IV., and infected young France with Anglomania in the form of horseracing and hard drinking. He made himself widely popular by profuse charity and by flinging open to the poor the splendid gardens of the Palais Royal. In the *lit de justice* of November 1787 he showed his liberalism boldly against the king, and was sent by a *lettre-de-cachet* to his château of Villers-Cotterets. As the States-general drew near he lavished his wealth in disseminating throughout France books and papers by Sieyès and other advocates of liberal ideas, and had himself put up in as many as five *bailliages*, but was elected in but three, Crèpy-le-Valois, Villers-Cotterets, and

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Paris. In October (1788) he promulgated his *Délibérations*, written by Laclos, to the effect that the *tiers état* was the nation, and in June 1789 he led the forty-seven nobles who seceded from their own order to join it. There is no doubt that, guided by Adrien Duport and others, he dreamed of some day becoming constitutional king of France, or at least regent, but it is no less certain that the indolent debauchee was to a great extent the mere dupe of a party, and at no time the deep designing villain he was believed to be at court. There the blame of everything was cast upon his head, even of such great outbursts of the revolutionary fever as the fall of the Bastille and the march of the women on Versailles. Orleans gradually lost influence, and felt so hopeless of the Revolution that he would willingly have gone to America had his mistress, the abandoned Comtesse de Buffon, consented to accompany him. From October 1789 to July 1790 he was absent in England on a mission, and after his return he took a smaller share in political matters than before, while his efforts to come to an understanding with the court were still met with repulse. In September 1792 all hereditary titles being swept away, he demanded a new name from the Paris electors, and adopted that of Philippe Égalité, suggested by Manuel. He was elected the twentieth deputy for Paris to the Convention, and gave his vote of death for the king, which sent a shudder to the heart even of the Mountain. His eldest son, the Duke of Chartres, afterwards King Louis-Philippe, was a brave and active officer on the staff of Dumouriez, and rode over with his chief into the Austrian camp. Égalité was at once arrested with all the Bourbons still in France, and, after six months' durance at Marseilles, was brought to Paris for trial. He was found guilty of royalism and conspiracy and guillotined the same day, 6th November 1793, dying with courteous phrases on his lips and all the high courage of the old régime.

See Baschet's *Histoire de Philippe Egalité*, the elaborate work by Tournois (2 vols. 1840–43), and Mrs Elliot's *Journal* (1859).

Orloff, a Russian family that first rose to eminence during the reign of Paul III., when one of its members, Gregory (1734–83), attracted the notice of the Grand-duchess Catharine, afterwards the Empress Catharine II., and succeeded Poniatowski as her favourite. It was this man who planned the murder of Peter III., and his brother Alexis (1737–1809) who committed the deed (1762). Both brothers were men of gigantic stature and herculean strength. The family of the Counts Bobrinski resulted from Gregory's intercourse with the empress. The legitimate line of Orloff soon became extinct; but Feodor, a brother of Gregory and Alexis, left four illegitimate sons, one of whom, Alexis (1787–1861), signalised himself during the French wars and in Turkey, negotiated the treaties of Adrianople (1829) and Unkiar-Skelessi (1833), and represented Russia at the London conference of 1832 on the affairs of Belgium and Holland. In 1844 he was placed at the head of the secret police, and stood high in favour with the Emperor Nicholas, who employed him in the negotiations with Austria previous to the Crimean war. In 1856 he sat in the congress of Paris as the representative of Russia, and on his return was made president of the grand council of the empire and president of the committee for the enfranchisement of the serfs.—For the Orloff diamond, see DIAMOND.

Ormer. See HALIOTIS.

Ormerod, ELEANOR A., entomologist, the daughter of George Ormerod (1785–1873), the historian of Cheshire. She commenced her contributions to the science of entomology in 1868 in connection with the Bethnal Green Museum. In 1880 she edited the *Cobham Journals*, being the meteorological and other observations made during forty years by Miss C. Molesworth, and involving enormous labour in the consultation of 75,000 observations. In 1882 Miss Ormerod was appointed consulting entomologist of the Royal Agricultural Society, and shortly afterwards became special lecturer on economic entomology at the Royal Agricultural College, Cirencester. Her *Manual of Injurious Insects* (1881) and her *Guide to Methods of Insect Life* (1884) are the most generally interesting of her works, which consist principally of papers on different injurious insects of South Africa and Australia, as well as of England.

Or'molu, a name sometimes given to brass of a golden yellow colour.

Ormonde, an old name for what became afterwards East Munster, comprising Tipperary.

Ormonde, JAMES BUTLER, DUKE OF, was the first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. The family was of illustrious antiquity. In the beginning of the 13th century Theobald Butler, from whom the Duke of Ormonde was descended, held the hereditary office of royal cupbearer or *butler* of Ireland. The subject of the present article was born in London in 1610. His father, the son of the celebrated Walter, Earl of Ormonde, was drowned in crossing the Channel; and the old earl having incurred the displeasure of the king, James I., and being thrown into prison, James, who on his father's death became, as Viscount Thurles, the heir of the title, was taken possession of as a royal ward, and placed under the guardianship of the Archbishop of Canterbury. On the restoration of his grandfather to liberty, he also was released; and in his twentieth year he married his cousin, Lady Elizabeth Preston, and in 1632 succeeded, upon his grandfather's death, to the earldom and estates of Ormonde. During the Strafford administration in Ireland Ormonde distinguished himself so much that on Strafford's recall he recommended him to the king; and in the rebellion of 1640 Ormonde was appointed to the chief command of the army. During the troubled times which followed he conducted himself with undoubted ability, although, as a necessary consequence of the numberless divisions and subdivisions of party which then prevailed in Ireland, he failed to satisfy any one of the conflicting sections; and when, in 1643, he concluded an armistice, his policy was loudly condemned as well by the friends as by the enemies of the royalist party in England. During the long contest of Charles with the Parliament, Ormonde continued to uphold the royal interest in his Irish government; and when the last crisis of the king's fortunes came, he resigned his Irish command, and retired to France, from which country he again returned to Ireland with the all but desperate design of restoring the royal authority. After a gallant but unequal struggle, he was, however, compelled, in 1650, to return to France. His services to the royal cause continued unremitting during his exile; and at the Restoration he accompanied Charles II. on his return, and was rewarded for his fidelity by the ducal title of Ormonde. His after-life was less eventful, although he twice again returned to the government of Ireland. It was in 1679 that the well-known attempt was made by the notorious Colonel Blood (q.v.) upon the life of Ormonde. As he was returning from a civic festival, he was attacked by Blood and a party of ruffians, and was dragged from his coach with the intention of his being hanged at Tyburn. The attempt drew additional interest from its being

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commonly supposed to have been instigated by the profligate Duke of Buckingham, Ormonde's inveterate foe. He escaped uninjured, and lived until the year 1688. As a soldier he exhibited both skill and bravery in command; and as a politician he was singularly upright in a period when there were many opportunities for the trimmer and the charlatan. His letters and other papers are full of deep historical interest. See Carte's *Life of Ormonde* (1735–36).

JAMES BUTLER, second Duke of Ormonde, was the grandson of the foregoing. He was born in Dublin in 1665, and when ten years of age was sent to France for his education, whence he returned after a few years, and was entered at Christ Church, Oxford. In 1682 he married Anne, daughter of Lord Hyde, afterwards Earl of Rochester. As Earl of Ossory he served in the army against Monmouth, and also held an office in the palace under James II. After his accession to the dukedom by the death of his grandfather in 1688, he took his share in the Revolution conflict, at first being for moderate measures; but he must have seen the futility of these, for afterwards, at the coronation of William and Mary, he acted as lord high-constable. He was present at the battle of the Boyne, at the head of William's life-guards. He soon became popular. In 1702 he was placed in command in the expedition against Cadiz; in 1703 he was appointed lord-lieutenant of Ireland, and in 1711 commander-in-chief of the land forces sent against France and Spain. After the accession of George I. Ormonde somehow fell into disgrace with the king, and was impeached in 1715 of high-treason, with the result that his estates were attainted, and he was deprived of all his honours. He retired into France, where he attached himself to the Jacobite court, and spent many years in the secret intrigues of the Pretender and his followers. He died abroad in 1746. A collection of letters written by him in the organisation of the abortive attempt by Spain to invade England and Scotland in 1719, and which led to the affair of Glenshiel (q.v.), were in 1890 brought to light, and in the following year prepared for publication in the issues of the Scottish History Society.

Ormskirk, a market-town of Lancashire, 12 miles NNE. of Liverpool. It has a grammar-school (1612); a parish church, with embattled tower and spire, and the burial-vault of the Earls of Derby; and manufactures of cordage, iron, silk, cotton, &c. Pop. (1851) 6183; (1881) 6651; (1891) 6298.

Or'mulum, a Transition-English metrical translation of the gospel history. See ENGLISH LITERATURE, Vol. IV. p. 367, and the edition of the Ormulum by White and Holt (2d ed. 1878).

Ormuz, or HORMUZ, a small town on the island of Jerun (12 miles in circuit), in the strait of Ormuz, at the entrance of the Persian Gulf, 4 miles S. of the Persian coast. Three centuries before the Christian era there existed on the mainland, 12 miles east of the island, a city Ormuz; this in the 13th century was the headquarters of the Persian trade with India. But about the end of the century its ruler transferred his people to the site of the present town, to escape the Mongols. The new city maintained its commercial supremacy even after it passed into the hands of the Portuguese, through Albuquerque's capture of it in 1507. It was taken from the Portuguese in 1622 by an English fleet (Baffin, the Arctic navigator, being killed in the action), and given to Shah Abbas of Persia, who transferred the trade to his port of Bandar Abbas, 12 miles north-west on the mainland. The Portuguese fort still stands, but the town of Ormuz is a ruin. The island yields salt and sulphur.

Ormuzd (*Ahurô-Mazdaô*), the name of the supreme deity of the ancient Persians, and of their descendants the Guebres and Parsees. It was at first emphatically employed in this sense by Zarathustra. See ZOROASTER.

Orne, a department of France formed out of the old provinces of Normandy, Alençon, and Perche, is separated from the English Channel on the W. by La Manche and on the N. by Calvados. Area, 2353 sq. m.; pop. (1861) 423,350; (1886) 367,248. A range of wooded hills, nowhere rising above 1370 feet, extends across the south of the department from east to west, separating the streams that flow north to the English Channel from those that go south to the Seine and Loire. Although the soil is fertile, agriculture is not in an advanced state. Apple and pear trees abound, and more than 22,000,000 gallons of cider are made every year. Cattle and horses of the purest Norman breed are reared. There are cotton and hemp spinning and cotton and linen weaving, dyeing, bleaching, and manufactures of gloves, iron, glass, &c. Fishing and bee-keeping are carried on. The department is divided into four arrondissements, Alençon, Argentan, Domfront, and Mortagne; capital, Alençon.

Ornithology, that branch of zoology of which the subject is Birds (q.v.).

Ornithorhynchus, or DUCKMOLE (also called Duck-billed Platypus, the 'water-mole' of colonials), one of the lowest mammals, found in the rivers of Australia and Tasmania. Along with the Porcupine Ant-eater (Echidna, q.v.) and a neighbour genus, the duckmole is included in the sub-class Prototheria or Ornithodelphia, co-extensive with the order Monotremata. These three genera are of great interest as 'living fossils,' retaining the ancient characters of primitive mammals.

The duckmole, represented by a single species (*Ornithorhynchus paradoxus* or *anatinus*), is a flat animal, between a foot and 18 inches in length,

Fig. 1.—Ornithorhynchus paradoxus.

not including the broad beaver-like tail, which measures 4–5 inches. The thick, soft fur is dark-brown above, rusty yellow below. The very short legs have webbed digits in adaptation to the swimming habits, and are also equipped with strong claws, utilised in burrowing. The 'duck-bill' is due to the anterior expansion of the premaxillæ and mandibles, is covered with a horny sheath, bears the nostrils far forward, and is provided with curious tactile structures. Behind the 'bill' is a loose, naked, sensitive collar. The eyes are very small, and there are no external ears. Within the mouth true teeth are present only in the earliest stages; their place is taken in the adults by eight horny plates, sharp-edged in front, broadened out behind. The tongue is not extensile. In the young of both sexes a curious perforated spur, associated with a gland, occurs near the heel, but

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this only persists in the males, which are further distinguished in being somewhat larger than their mates. The body temperature is peculiarly low. The voice resembles the growl of a small puppy. No fossil forms are known.

This lowly mammal is essentially aquatic, living in rivers and 'ponds,' swimming and diving admirably. It is lively and active, diving when alarmed, and able to remain several minutes under water. It constructs on the bank elaborate burrows (sometimes 20 to 50 feet in length) with two entrances — one above, the other under water. Like many other defenceless animals, it is most active in the twilight. It grubs in the mud for worms, water-insects, molluscs, &c., which it can temporarily stow away in cheek-pouches. When frightened or asleep it often rolls itself up, in hedgehog fashion, into a living ball. It appears to live amicably with the water-rat, but is molested by carnivorous marsupials, and is often wantonly, though fortunately not easily, shot. The eggs—for the discredited oviparous habit has been confirmed—are laid in a rough nest within the burrow. The young appear to use their bills in breaking the tough shell. The animals have a fishy, oily smell. The flesh is eaten by the omnivorous natives, who are said especially to esteem the young forms.

Fig. 2.
Ornithorhynchus asleep.

Many of the enigmas about the duckmole's structure and affinities are still unsolved, but there is no doubt that along with its neighbours it links mammals back to reptilian or even amphibian types. It need hardly be stated that it has no close connection with birds. Some of the most important structural characters may be briefly summarised: The bones of the skull fuse and are polished as in birds; the halves of the lower jaw do not unite in front, and have no ascending process; the bones of the ear are in a primitive state. There are important technical peculiarities in the vertebræ, ribs, hip-girdle, &c. Epipubic bones, for instance, occur as in marsupials. The coracoids are remarkable in reaching the sternum, and the breastbone is like that of the lizard and some other reptiles. The brain is smooth, and old fashioned in having a small corpus callosum and large anterior commissure. There is a common cloaca, receiving the rectum and the urino-genital canal. The heart in its structure is like that of birds. The ureters do not open into the neck of the bladder, but farther down into the short urino-genital canal. The left ovary is larger than the right, and the testes are abdominal. The oviducts have no 'fimbriated' upper ends, are separate throughout their course, open into the urino-genital passage, and thence into the cloaca. The vasa deferentia are open separately in the same way, and have only a temporary connection with the penis, which lies attached to the wall of the cloaca. The two milk-glands open on a flat bare patch of skin. As the duckmole is oviparous, there is of course no placenta. The eggs, like those of reptiles, undergo partial segmentation.

From the above it will be seen that the duckmole not only represents the lowest extant stage of mammalian evolution, but preserves, more markedly than the higher forms, traces of the far-off pedigree of the class.

See ECHIDNA, MAMMAL, MARSUPIAL; also Gould's *Mammals of Australia* (3 vols. 1845–63); Huxley's *Vertebrates*, and text-books of Comparative Anatomy; W. K. Parker's *Mammalian Descent*; Flower's *Osteology of the Mammalia*; Spencer, *Nature*, xxxi. (1884–85).

Orobancheæ, or OROBANCHACEÆ, a natural order of parasitical herbs, generally with simple stems clothed with brown, purplish, yellow, or blue, but never green scales, instead of true leaves; terminating in a spike of flowers each in the axil of a scale or bract similar in colour and character to those of the stem. The species known considerably exceed one hundred in number, and are spread over the greater part of the globe, chiefly in temperate climates, but more abundant in the Old World than in the New. Eight species are natives of Britain, seven of which belong to the genus Orobanche (Broomrapes), and one species to Lathræa (Toothwort). In Britain they are all rather rare or purely local plants. High medicinal virtues formerly were ascribed to some of the species, especially to *Epiphegus virginiana* (see CANCER-ROOT), which are now discredited. With *Phelipæa lutea* the Egyptians dye the ropes made of the palm *Hyphæne thebaica* black.

Orobus, a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, allied to Vetches, and sometimes called Bitter Vetch. The species are perennial herbaceous plants, chiefly natives of Europe. They afford good food for cattle. Two are natives of Britain, of which the most common is *O. tuberosus*, whose racemes of purple flowers often adorn heaths and bushy places, especially in hilly districts. Its roots are creeping and swell out into tubers at irregular intervals. The tubers have a sweet taste, resembling that of liquorice, and are sought after by children; they are also bruised and steeped in water in some parts of the Highlands of Scotland to make a fermented liquor, and a kind of liquor is made also by steeping them in whisky; they are well flavoured and nutritious when boiled or roasted, and are used in this way in the Highlands of Scotland, in Holland, Belgium, and other countries.

Bitter Vetch (*Orobus tuberosus*):
a, standard of the corolla.

Orontes, the ancient name of a river in Syria, now called *Nahr-el-Asi*. It rises in the highest part of Cœle-Syria, near Baalbek, flows northward between the mountains of Libanus and Anti-Libanus, as far as the city of Antioch, and then westward to the Mediterranean Sea, through a total course of 147 miles. Its lower course is remarkably beautiful; its rocky banks are 300 feet high, and the windings of the river show them off to the greatest advantage. Myrtles, laurels, figs, wild vines, arbutus, dwarf-oaks, and sycamores grow up the cliffs in picturesque irregularity. The country through which the river flows is in many parts richly cultivated.

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Orosius, PAULUS, a Spanish presbyter and historian, was born at Tarragona, and flourished in the 5th century. He visited Augustine in 415, and presented to him his work written against the heresies of Priscillian and Origen. He went thence to Palestine to study under Jerome at Bethlehem. His chief work, the *Historiarum adversus Paganos Libri vii.*, begins with the creation and goes down to 417 A.D. It is apologetic in design, intended as a complement to the great work of Augustine written to prove from historical evidence that the prevailing evils of the time were not due to Christianity. It is based on the chronicle of Eusebius-Jerome, and on Livy, Eutropius, Justin, Tacitus, and Suetonius; but the work is a trivial, inaccurate, uncritical miscellany of facts, although the style is elegant if *watery*, in Bacon's phrase. It was a favourite text-book of universal history during the middle ages, and had the honour of being translated into Anglo-Saxon by Alfred (ed. by Bosworth in 1851, and by H. Sweet from Lord Tollemache's 9th-century MS. 1883 *et seq.*). Some MSS. bear the puzzling title of *Hornesta* or *Ormista*, conjectured by some to be a corruption of *Or. m. ista*—i.e. *Orosii mundi istoria*, or perhaps *Orosii miseriarum* (mundi) *istoria*.

The editio princeps appeared at Vienna in 1471; the best edition is that by C. Zangemeister in *Corpus Script. Eccles. Latin.* (Vienna, 1882). The edition of Havercamp (1738) was reprinted in vol. ix. of Galland's *Bib. Pat.* (1773) and vol. xxxi. of Migne's *Patrol.* (1846); the history alone by Dr Brohm (Thorn, 1877). An earlier English translation (1773) was reprinted in Bohn's 'Antiquarian Library' (1853).

Orotava, a town on the north coast of Teneriffe, one of the Canary Islands, is situated below the Peak, in one of the pleasantest districts in the world. Pop. 8293.

Orpheus, a Greek hero, a son of Apollo and the Muse Calliope, or of Œagrus and Clio or Polyhymnia. His native country is Thracia, where many different localities were pointed out as his birthplace. Apollo bestows upon him the lyre, which Hermes invented, and by its aid Orpheus moves men and beasts, the birds in the air, the fishes in the deep, the trees, and the rocks. He accompanies the Argonauts in their expedition, and the power of his music wards off all mishaps and disasters, rocking monsters to sleep and stopping cliffs in their downward rush. His wife, Eurydice, is bitten by a serpent and dies. Orpheus follows her into the infernal regions; and so powerful are his 'golden tones' that even stern Pluto and Proserpine are moved to pity, while Tantalus forgets his thirst, Ixion's wheel ceases to revolve, and the Danaïds stop in their wearisome task. He is allowed to take her back into the 'light of heaven,' but he must not look around while they ascend. Love or doubt, however, draws his eyes towards her, and she is lost to him for ever. His death is sudden and violent. According to some accounts, it is the thunderbolt of Zeus that cuts him off, because he reveals the divine mysteries; according to others, it is Dionysus, who, angry at his refusing to worship him, causes the Mænads to tear him to pieces, which pieces are collected and buried by the Muses in tearful piety at Leibethra, at the foot of Olympus, where a nightingale sings over his grave. Others, again, make the Thracian women divide his limbs between them, either from excessive madness of unrequited love or from anger at his drawing their husbands away from them. The faint glimmer of historical truth hidden beneath these myths becomes clearer in those records which speak of Orpheus as a divine bard or priest in the service of Zagreus, the Thracian Dionysus, and founder of the Mysteries (q.v.); as the first musician, the first inaugurator of the rites of expiation and of the Mantic art, the inventor of letters and the heroic metre; of everything, in fact, that was supposed to have contributed to the civilisation and initiation into a more humane worship of the deity among the primitive inhabitants of Thracia and all Greece. A kind of monastic order sprang up in later times, calling itself after him, which combined with a sort of enthusiastic creed about the migration of souls and other mystic doctrines a semi-ascetic life. Abstinence from meat (not from wine), frequent purifications and other expiatory rites, incantations, the wearing of white garments and similar things were among their fundamental rules and ceremonies. But after a brief duration the brotherhood, having first, during the last days of the Roman empire, passed through the stage of conscious and very profitable jugglery, sank into oblivion, together with their 'orpheotelistic' formulas and sacrifices.

Orpheus has also given the name to a special literature called the Orphic, and was called the first poet of the heroic age, anterior to both Homer and Hesiod. The fragments current under his name were first collected at the time of the Pisistratidæ, chiefly by Onomacritus, and these fragments grew under the hands of the Orphic brotherhood, aided by the Pythagoreans, to a vast literature of sacred mythological songs sung at the public games, chanted by the priests at their service, worked out for dramatic and pantomimic purposes by the dramatists, commented upon, philosophised upon, and 'improved' by grammarians, philosophers, and theologians. Although authorities like Herodotus and Aristotle had already combated the supposed antiquity of the so-called Orphic myths and songs of their day, yet the entire enormous Orphic literature which had grown out of them retained its 'ancient' authority, not only with both the Hellenists and the church fathers of the 3d and 4th centuries A.D., but down almost to the last generation, when it was irrefutably proved to be in its main bulk, as far as it has survived, the production of those very 3d and 4th centuries A.D., raised upon a few scanty, primitive snatches. The most remarkable part of the Orphic literature is its Theogony, which is based mainly on that of Hesiod. The story of Orpheus also occurs in English and other mediæval literature.

Besides the fragments of the Theogony which have survived, imbedded chiefly in the writings of the Neoplatonists, are to be mentioned the *Argonautica*, a poem of the Byzantine period, consisting of 1384 hexameters; further, a collection of 87 or 88 liturgical hymns; a work on the virtues of stones, called *Lythica*, &c. Other poems belonging to the Orphic Cycle, of which, however, only names have survived in most instances, are *Sacred Legends*, ascribed to Cercops; a Poem on Nature, called *Physica*, probably by Brontinus; *Bacchica*, supposed to be written by Avignota, the daughter of Pythagoras; *Minyas*, or Orpheus' descent into Hades; and other poetical productions by Zopyrus, Timocles, Nicias, Persinus, Prodicus, &c. The hymns have repeatedly been translated.

See the editions of the *Orphica* by Hermann (1805) and Abel (1885); Lobeck's *Aglaophamus* (1829); and Gerhard, *Orpheus und die Orphiker* (1861).

Orpiment. See ARSENIC.

Orpine, a kind of Sedum (q.v.).

Orpington, a village of Kent, England, 12 miles by rail SE. of London, where Ruskin's books began to be published in 1873 (see E. T. Cook, *Studies in Ruskin*, 1890). Pop. 3090.

Orrery, a machine constructed for the purpose of exhibiting the motions of the planets round the sun, and of the satellites round their primaries, which was in high repute during the 18th and

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beginning of the 19th centuries, though now regarded as a mere toy. Made by Rowley in 1715 at the expense of Charles Boyle (q.v.), Earl of Orrery, it was a combination of the old Planetarium of the 16th century with other machines which showed the motions of the earth, moon, and planetary satellites. Though the construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets is impossible, yet an orrery is in some degree useful as giving a general notion of the way in which the planetary motions are performed. As it was a favourite machine at one time, a description of it may not be uninteresting. A number of iron tubes equal in number to the planets, and of different dimensions, are placed one within the other; their lengths being arranged so that the innermost tube projects at both ends beyond the one next to it, that one similarly projects beyond the third, and so on. At one end of each tube a rod is fixed at right angles, and a ball or lamp attached to its end; the lengths of the rods being proportional (or at least supposed to be so) to the radii of the planetary orbits. The other ends of the tubes form the axes of toothed wheels, which are connected, either directly or by means of combinations of toothed wheels, with a winch. The several combinations of wheels are so adjusted that the velocity of revolution of the rods is proportional to the times of revolution of the planets. On turning the winch the whole apparatus is set in motion, and the balls or lamps (representing the planets) revolve round the centre, which is a fixed lamp (representing the sun), at different distances, and with varying velocities.

Orris-root (probably a corruption of *Iris* Root), the root-stock (*rhizome*) of certain species of Iris (q.v.), natives of the south of Europe, belonging to the division of the genus having bearded flowers, sword-shaped leaves, and scapes taller than the leaves—viz. *I. florentina*, a species with white flowers; *I. pallida*, which has pale flowers; and *I. germanica*, which has deep purple flowers. The flowers of all these species are fragrant. *I. germanica* extends farther north than the other species, and its root is sometimes said to be more acrid. Orris-root was formerly used in many medicinal preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. Its chief use is in perfumery. It has a pleasant smell of violets, which it acquires in drying. Hair and tooth powders, and oils, are often scented with it. A tincture of it also is used as a scent, and is often sold as *Essence of Violets*.

Orsay. See D'ORSAY.

Orsini, FELICE, conspirator, was born in December 1819, at Meldola, in the States of the Church, and studied at Bologna. He belonged to a branch of a noble family, long famous as supporters of the Guelfic party, which produced famous scholars, soldiers, and churchmen (including two popes, Nicholas III. and Benedict XIII.). Felice, the son of a conspirator, was early initiated into secret societies, and in 1844 was sentenced at Rome to the galleys for life. The amnesty of Pius IX. (1846) restored him to liberty, but he was soon again imprisoned for participation in political plots. When the revolution of 1848 broke out Orsini was elected a deputy to the Roman Constituent Assembly, and, invested with extraordinary powers, was sent to Ancona and Ascoli to suppress brigandage. He signalised himself by the violence with which he executed his commission. He also took part in the defence of Rome and Venice; agitated in Genoa and the duchy of Modena; and in 1853 was shipped by the Sardinian government to England, where he formed close relations with Mazzini. Furnished with money by the leaders of the revolutionary party, he appeared at Parma in 1854, and afterwards at Milan, Trieste, Vienna, everywhere agitating in the interest of insurrection; until at last he was arrested at Hermannstadt, and confined in the fortress of Mantua. In 1856 he succeeded in making his escape, and found refuge in England, where he supported himself by public lecturing, and wrote *Austrian Dungeons in Italy* (1856). Towards the end of 1857 he repaired to Paris, with the intention of assassinating Napoleon III., whom he reckoned the great obstacle to the progress of revolution in Italy. His associates in this diabolical design were persons named Pieri, Rudio, and Gomez. They took up their station in a house close by the Opera, and on the evening of the 14th January 1858, just as the carriage containing the emperor and empress was drawing up, they threw three bombs under it. An explosion took place, and 10 persons were killed, 156 wounded, but Napoleon and the empress remained unhurt. The assassins were arrested, tried, and sentenced; Orsini, Pieri, and Rudio, to capital punishment, Gomez to penal servitude for life. Rudio's life was spared at the intercession of the empress, but Pieri and Orsini were guillotined on 13th March. See *Memoirs and Adventures of Orsini, written by himself* (Eng. trans. Edin. 1857); his Letters (2 vols. Milan, 1861); and a work by Montazio (1862).

Orsova, the name of two towns on the Danube over against the Iron Gates. OLD ORSOVA, a Hungarian place, is 478 miles by rail SE. of Vienna, and is a station for the Danube steamers. Pop. 3381.—NEW ORSOVA, on the Servian side, is a fortified town held by Austria (since 1878), who also were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. In September 1890 a beginning was made with the removal of the rocky impediments known as the Iron Gates (see DANUBE).

Ortegal, CAPE, the north-west extremity of Spain (q.v.), in Galicia.

Ortelius, the Latin form of the name of ABRAHAM ORTELL, or ÖRTEL, who, born of German parents in 1527 at Antwerp, where he also died in 1598, published the earliest atlas under the title *Theatrum Orbis Terrarum* (1570); a critical work on ancient geography, *Synonymia Geographica* (1578), re-issued, greatly improved, as *Thesaurus Geographicus* (1596); and other geographical works. He was also a frequent traveller to England, Ireland (1577), and Italy, and the countries between.

Orthez, a town in the French department of Basses-Pyrénées, on the right bank of the Gave de Pau, 41 miles by rail E. of Bayonne. The 'Tour de Moncade' (1240), the stately castle of the counts of Foix (q.v.), which Froissart visited in 1388, was reduced to a ruin by Richelieu. Near Orthez Wellington gained a decisive victory over Soult, 27th February 1814. Pop. 4757.

Orthoceras, a large genus of common fossil Cephalopods. The shells are quite straight, but a gradual series of forms lead on to the Nautilus type. Some species of orthoceras were gigantic; thus, *O. titan* in its fossil state is said to have weighed some tons.

Orthoclase-porphyry, a crystalline igneous rock, of variable colour, but generally reddish. It is fine-grained and compact in texture. The ground-mass is felspathic, and micro- or crypto-crystalline; now and again it shows a little glassy or devitrified matter. Scattered through this ground-mass are microscopic crystals of orthoclase, and usually some hornblende and biotite in small

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granules, crystals, and scales. The rock is met with amongst Palæozoic strata, both as contemporaneous lava-flows and as intrusive masses. See also FELSPAR, and IGNEOUS ROCKS.

Orthoclase-rocks. See PETROGRAPHY.

Orthodoxy (Gr. *orthos*, 'right,' and *doxa*, 'an opinion'), a name given by theologians to religious opinions in agreement with Scripture and historical tradition, or rather with the interpretation of these entertained by the particular church to which they themselves happen to belong. While it is true that the great cardinal and essential points of Christian dogma have been preserved by all sections of the Church of Christ, the gravest divergences have also arisen, alike in doctrine and practice, each fortified by an assumed infallible interpretation of the letter of Scripture or the line of historical descent in the usage of the church.—The antithesis of *orthodoxy* is *heterodoxy* (*heteros*, 'other'—i.e. 'wrong,' and *doxa*, 'opinion').

Orthoepy (Gr. *orthos*, 'right;' *epos*, 'a word'), a branch of grammar that treats of the correct pronunciation of the words of a language.

Orthography. See SPELLING.

Orthoptera (Gr., 'straight-winged'), an order of Insects (q.v.).

Or'tolan (*Emberiza hortulana*), a species of Bunting (q.v.) of the Finch family Fringillidæ. The adult male is about six inches long; has the head, neck, and upper breast slate-gray suffused with yellow; bill reddish brown; chin, throat, and feathers round the eye yellow, with a narrow band of greenish gray descending from a little in front of the angle of the mouth; back, wing-coverts and secondaries fulvous brown with dark stripes; rump reddish brown. The plumage of the female is paler in colour. The ortolan in its summer migrations ranges as far north as the Arctic Circle in Scandinavia. In the south of Europe, where it is found in great numbers, and in the north of Africa, where it sometimes breeds, it is but a summer visitor. In winter it migrates as far south as to Abyssinia and North-western India, but its true winter-quarters have not yet been accurately ascertained. Though enormously abundant in certain localities on the Continent, it is rare in Britain, and many of the specimens captured have no doubt escaped from captivity, considering the large quantities imported alive from Holland and Belgium. It frequents bushy places, and builds its nest of dry grass always on the ground and generally in the open fields, though sometimes among herbage or under low bushes. It lays from four to six eggs, which vary in colour from very pale-bluish white to salmon colour, spotted with rich purple brown, with underlying spots of pale violet, not streaked as is usual with other buntings. The note of the male is rather metallic, and his song at times is incessant and very monotonous. The food consists of beetles and other insects and seeds. Large numbers of ortolans are netted during their migrations, and confined in dark or dimly-lighted rooms, where they are fattened upon oats and millet until ready for the table. Their flesh is considered a great delicacy.

Ortolan (*Emberiza hortulana*).

Orton, ARTHUR. See TICHBORNE.

Ortona, a town of Italy, on the Adriatic, 104 miles by rail SSE. of Ancona. It has a cathedral and a recently improved harbour. Pop. 6366.

Ortyx. See VIRGINIAN QUAIL.

Oruro, capital of the department of Oruro, in Bolivia, stands on a saline plain 11,960 feet above the sea, near the salt lake of Aullagas, and possesses mines of silver, gold, and tin. Founded in 1590, it had 70,000 inhabitants in the 17th century, but now has less than 7000.—The *department*, which borders on Peru, has an area of 21,600 sq. m. and a pop. of 111,400. The soil is saline, and far from fertile, but the mineral wealth is great.

Orvieto, a city in the Italian province of Perugia, 78 miles NNW. of Rome, crowns an isolated tufa rock, which rises 765 feet above the river Paglia, and 1327 above sea-level. The cruciform cathedral (1290-1580), one of the most beautiful and richly decorated specimens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The façade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior also is magnificently decorated with sculptures and with paintings by Luca Signorelli, Fra Angelico, &c. The bishop's palace and St Patrick's Well (1527-40), with its 250 steps, are also noteworthy. Pop. 7304. Orvieto, called in the 7th century A.D. *Urbs Vetus*—of which its present name is a corruption—has by some been supposed to occupy the site of the Etruscan Volsinii. In the middle ages it gave shelter to thirty-two popes. See works by Gruner (Leip. 1858), Berir (Lond. 1884), and Piccolomini (Siena, 1885).

Orwell. See IPSWICH.

Oryx, an old name given to several large and heavy African antelopes, with very long, slightly curved horns. One species (*Hippotragus leucoryx*) frequents the deserts of Central Africa, and once extended farther north, as is shown by the frequency of its apparently 'unicorn' figure on ancient monuments. Another form (*H. capensis*) is found in Kaffraria. But the name oryx has been used somewhat widely. See ANTELOPE.

Oryza. See RICE.

Osage Orange (*Maclura aurantiaca*), a tree of the natural order Moraceæ, a native of North America. It attains a height varying, according to soil and situation, from 20 to 60 feet. It is of the same genus with Fustic (q.v.), and its wood, which is bright yellow, probably might be used for dyeing. The wood is fine-grained and very elastic, and takes a high polish; it is much used for fence-posts, sleepers, paving-blocks, &c. The tree is largely employed in America, especially in the west, as a hedge-plant; it has also been introduced into Britain for that purpose, but has not met with general appreciation. Its fruit is about the size of a large orange, has a tuberculated surface of a golden colour, and is filled internally with radiating, somewhat woody fibres, and with a yellow milky juice, the odour of which is generally disliked, so that the fruit, although not unwholesome, is seldom eaten.

Osages, a tribe of American Indians, of the Dakota stock, formerly very troublesome, but now settled in the north of Indian Territory, with Quaker teachers. They number about 1200.

Osaka, or OZAKA, an important city of central Japan, situated at the head of the gulf of the same name, and at the mouth of the Yodo River, which issues from Lake Biwa. The city covers an area of

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about 8 sq. m., and is intersected with canals. Its fine castle, the stones of whose walls are of astonishing size, was constructed by Hideysohi's orders in 1583, and the palace, built afterwards in its precincts and destroyed in 1868, was perhaps the most magnificent structure in Japan. Osaka is the great commercial centre of the empire, and the headquarters of the rice and tea trade. Its port does not admit of the entrance of large vessels. There is a foreign settlement, mostly occupied by missionaries. Pop. (1889) 361,694.

Osborn, SHERARD, admiral and Arctic navigator, was born at Madras, 25th April 1822, the son of an English officer, and entered the navy in 1837. He took part in the capture of Canton (1841), and of the defences of Woo-sung (1842); commanded vessels in two expeditions sent out in 1849 and 1852–55 respectively to search for Sir John Franklin; was head of the division of the British fleet that served in the Sea of Azov during the Crimean war; and took a leading share in the Chinese war of 1857–59, penetrating up the Yang-tsze-kiang as far as Hankow. After his retirement from active duty he superintended the construction of a submarine telegraph between Great Britain and Australia, and was made rear-admiral in 1873. He died 6th May 1875. Besides publishing *Stray Leaves from an Arctic Journal* (1852), *Journals of Robert M'Clure* (1856), and *Career, Last Voyage, and Fate of Sir John Franklin* (1860), he proved his interest in Arctic exploration by inducing A. H. Markham to test the navigability of Baffin Bay in winter (1873) by steam-power, and by helping to fit out the expedition which sailed under command of Nares, Markham, and others in 1875.

Osborne House. See COWES.

Osborne or **St Helen's Beds.** See OLIGOCENE SYSTEM.

Oscans (Lat. *Osci* or *Opsci*; Gr. *Opikoi*), the name of an Italian people, who at an early period occupied Campania, and were either closely allied to or the same race as the Ausones. Subsequently (about 423 B.C.) Samnites from the hilly districts to the north overran the country, and amalgamated with the inhabitants whom they had subjugated; and the names *Osci* and *Oscan language* were subsequently applied to all the other races and dialects whose origin was nearly or wholly the same. The Oscan language was not substantially different from the Latin, but only a ruder and more primitive form of the same central Italic tongue. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (88 B.C.), an end was put to the official use of the Oscan tongue; nevertheless, in the time of Varro (1st century B.C.) it was still used by the people. During its most flourishing period it was something more than a country *patois;* it is even possible that the Oscans had a literature and art of their own (see ATELLANÆ). Besides a considerable number of coins with Oscan legends, there are still extant a number of inscriptions in the Oscan tongue (see INSCRIPTIONS).

See Mommsen's *Oskische Studien* (1845), and *Unteritalischen Dialekte* (Leip. 1850); Zvetaieff's *Sylloge Inscr. Oscarum* (Petersb. 1878).

Osceola (*As-se-he-ho-lar*, 'Black Drink'), a Seminole chief, was born in Georgia in 1804, the son of an English trader, named Powell, and of a chief's daughter. With her he removed to Florida while a child, and there attained great influence among the Indians. In 1835 his wife, the daughter of a runaway slave, was seized as a slave. The outraged husband threatened revenge, and for his threats was imprisoned six days in irons by General Thompson: six months afterwards he killed the general and four others outside Fort King. This was the beginning of the second Seminole war. He then placed himself at the head of a band which had surprised and massacred Major Dade and a detachment of soldiers, and taking to the almost impenetrable Everglades, with two or three hundred followers, he fought for nearly two years with great energy and skill the superior numbers sent against him. He was taken prisoner at last, in October 1837, by General Jesup, while holding a conference under a flag of truce—an act of inexcusable treachery, though represented as one of retaliation—and confined in Fort Moultrie until his death, 30th January 1838. Mayne Reid, in *Oceola*, has woven the story into a romance.

Oscott, a Roman Catholic college, near Birmingham, which claims to be the centre of the Roman Catholic movement in England. The name (or *Auscott*, as it is spelt in Camden's *Britannia*) is first met with towards the close of the 17th century as the seat of a Catholic mission, which continued to be served by different priests till in 1752 it was formed into a college for the education of both laymen and ecclesiastics, and called St Mary's College. In 1835 the present fine buildings were erected, and in 1889 the establishment became purely ecclesiastical, no longer admitting lay students. It is now styled St Mary's Seminary, and the curriculum includes a course of higher classics, science, and mathematics, to meet the requirements of the London University B.A. Exam. After this the course consists of two years of mental philosophy and three and a half of theology and kindred subjects. The staff includes a rector, vice-rector, and eight professors, and the seminary is open to students from any British diocese.

O'Shaughnessy, ARTHUR, minor poet, was born in London, 14th March 1846. He was employed in the natural history division of the British Museum, married a daughter of Dr Westland Marston, whom he lost in 1879, and followed to the grave on 31st January 1881. During his brief life he published *Epic of Women* (1871), *The Lays of France* (1872), and *Music and Moonlight* (1874); and soon after his death appeared *Songs of a Worker* (1881). As a poet he is somewhat diffuse, over-gorgeous in colour, and not sufficiently discerning in his admiration for modern French models; yet he reveals imagination, passion, tenderness, melody, and a mastery of lyrical forms.

Oshkosh, capital of Winnebago county, Wisconsin, on both sides of the Fox River, at its entrance to Lake Winnebago, 80 miles by rail NNW. of Milwaukee. The lake (30 miles by 12), with the Fox and Wisconsin rivers, which are connected by a canal, forms a water-route between Lakes Michigan and Superior. The city extends along the lake for 4 miles, and contains a number of handsome buildings. It carries on a great trade in lumber, and contains fifteen sawmills, extensive door and sash factories, and large manufactories of furniture, matches, carriages, and soap, besides pork-packing establishments. It is the seat of a state normal school, and close by is a state lunatic asylum. Oshkosh was incorporated in 1853, and burned down in 1859; it was again partially destroyed by fire in 1874 and 1875, and in 1885 a cyclone overwhelmed part of the suburbs. Pop. (1880) 15,748; (1890) 22,836.

Osiander, ANDREAS, German reformer, was born on 19th December 1498, at Gunzenhausen, near Nuremberg. His name is a Græcised form of the original German Heiligmann or Hosemann. Educated at Ingolstadt, he declared himself an adherent of Luther, and became a preacher at Nuremberg (1522), persuaded that city to declare itself Lutheran, took part in the conference at Marburg (1529), and was present at the diet of

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Augsburg (1530), and at the signing of the Schmalkald articles (1537). In 1548 he was deprived of his office as preacher because he refused to agree to the Augsburg Interim; but was immediately afterwards invited by Albert, Duke of Prussia, to become professor of Theology in the newly-established university of Königsberg. He was hardly settled there when he became entangled in a theological strife that was greatly embittered by his vehement and arrogant temper. In a treatise, *De Lege et Evangelio*, Osiander asserted that the righteousness by which sinners are justified is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q.v.). Osiander's death in the midst of this fierce polemical war, on 17th October 1552, did not check it; the battle was continued by his followers, called Osiandrists, and led by his son-in-law Funk, who was executed for high-treason in 1566, and the entire party was banished from Prussia in 1567. See Lives by Wilken (1844), Möller (1870), and Hase (1879). Osiander's son Lukas (1534–1604) and *his* son Lukas (1571–1638) won reputations as theologians of note.

Osier, the popular name of those species of Willow (q.v.) which are used chiefly for basket-making and other wickerwork. They are of low bushy growth, few of them ever becoming trees, their branches long and slender; and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches. The Common Osier (*Salix viminalis*), a common native of wet alluvial grounds in Britain and many parts of Europe, is one of those which sometimes become trees, although when cultivated for basket-making it is not permitted to do so. It is often planted to prevent the banks of rivers from being washed away. Its branches are used for making hoops and coarse baskets. There are several varieties in cultivation, not easily distinguished except by a very practised eye, but much more useful than the original or wild kind, which is apt to break, and therefore of little value. More suitable for the finer kinds of basket-making are *Salix forbyana*, sometimes called the Fine Basket Osier, and *S. rubra*, known near London as the Green-leaved Osier or Ornard; *S. triandra*, a triandrous species, known to English osier-cultivators and basket-makers as the Spaniard Rod; whilst *S. vitellina*, a pentandrous species, sometimes becoming a tree, is the Golden Osier or Golden Willow, remarkable for the bright-yellow colour of its branches, as well as for their pliancy and toughness. There are other species, not natives of Britain, which also are valuable.

Common Osier (*Salix viminalis*): *a*, male catkin; *b*, female catkin.

Osiers are very extensively cultivated in Holland, Belgium, and France, on alluvial soils, especially near the mouths of rivers; and from these countries great quantities of 'rods' are imported into Britain. They are cultivated also to a considerable extent in some parts of England, particularly on the banks of the Thames and the Severn, and in the level districts of Cambridgeshire, Huntingdonshire, &c. Islets in the Thames and other rivers, entirely planted with osiers, are called *Osier holts*. Osiers grow particularly well on grounds flooded by the tide. Much depends on the closeness of planting of osier grounds; as when space is too abundant the shoots of many of the kinds do not grow up so long, slender, and unbranched as is desirable. The French cultivators, when they wish osiers for the finest kinds of basket-work, cut branches into little bits with a bud or eye in each, and plant these pretty close together, so as to obtain weak but fine shoots; but generally cuttings of 15 or 16 inches in length are used, and of tolerably thick branches, and these are placed in rows from 18 inches to 2 feet apart, and at distances of 15 to 18 inches in the row. Osier plantations in light soils continue productive for fifteen or twenty years, and much longer in rich alluvial soils. Osiers succeed best in rich soils, but not in clays. No cultivation is required after planting; but the shoots are cut once a year, at any time between the fall of the leaf and the rising of the sap in spring. After cutting they are sorted, and those intended for brown baskets are carefully dried and stacked, care being taken that they do not *heat*, to which they are liable, like hay, and by which they would be rotted and rendered worthless. The stacks must be protected carefully from rain. The osiers intended for white baskets cannot at once be peeled, but, after being sorted, they are placed upright in wide shallow trenches, in which there is water to the depth of about four inches, or in rivulets, being kept secure in their upright position by posts and rails; and thus they remain till they begin to bud and blossom in spring, which they do as if they remained on the parent plant, sending forth small roots at the same time into the water. They are then, in ordinary seasons, easily peeled by drawing them through an instrument called a *break*, but in cold springs it is sometimes necessary to lay them for a while under a quantity of litter. After being peeled, they are stacked, preparatory to sale. See BASKET.

Osiris, greatest of Egyptian gods, is the son of Seb (the Earth—here the father) and Nut (Heaven—the mother). He wedded Isis his sister while they were yet in the womb; was slain by Set, was avenged by his son Horus, and judges the dead in the nether world. The myth is generally interpreted by taking Osiris for the Sun, Set for darkness. Osiris had by Nephthys another son Anubis (i.e. Dusk), who is said to have swallowed his father. Osiris has also been identified with the god Ra, with the Moon, with the Nile, and with the annual sun-period or summer (as against the daily appearing sun). For further discussion of the myth, see ISIS, and works there quoted; also Wiedemann, *Die Religion der Alten Ægypter* (1890).

Oskaloosa, capital of Mahaska county, Iowa, 104 miles by rail WNW. of Burlington. It possesses mines of bituminous coal, and manufactures flour, woollens, boilers, electric appliances, &c. Here are Penn College (Quaker) and two others. Pop. (1885) 6012.

Osmium (sym. Os; atom. wt. 191) is a metal which occurs in association with platinum in the form of an osmium-iridium alloy. It may be obtained in the metallic condition by several processes which yield it either as a black amorphous powder or in hard bluish-white crystals. It is the least fusible of all the metals, the oxyhydrogen jet volatilising, but not fusing it. It is the heaviest

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substance known, its specific gravity being 22·477. Four oxides of osmium are known. Three of these—viz. the protoxide, OsO, the sesquioxide, Os_2O_3, and the binoxide, OsO_2, are black or grayish-black powders. The peroxide, OsO_4, commonly called osmic acid, is the most important oxide. It is produced when the metal is heated strongly in air or oxygen, and forms colourless, glistening, acicular crystals, freely soluble in water, and very volatile. At about 100° C. this compound gives off an extremely irritating and irrespirable vapour; and hence the name of the metal (from the Greek word *osmē*, 'odour'). It produces a permanent black stain upon the skin, and at the same time causes an eruption which is difficult to heal. It violently attacks all the mucous membranes, and its vapour may cause partial or total blindness by depositing a film of metallic osmium on the eyes. A solution of the peroxide is employed in histological work for staining fat and nerve substance. Osmium also forms two chlorides; and osmates, corresponding to an unknown osmic acid, have been prepared. This metal was discovered by Tennant in 1803.

Osmose, the interdiffusion of two liquids through a septum, usually of bladder or of parchment paper. If a bottle, filled with one liquid, be closed by parchment paper, and be completely immersed in a vessel containing another liquid, increase or decrease of the contents of the bottle will occur according as the liquid contained in the bottle passes out through the septum less quickly or more quickly than the other liquid passes inwards. When the contents are increased the phenomenon has been called *endosmose;* when they decrease it has been termed *exosmose.* The distinction is obviously not a scientific one; for a reversal of the positions of the liquids will cause a reversal of the osmotic process, so that the process which was formerly denominated exosmose must now be called endosmose, and *vice versâ.* The phenomenon is one of extreme importance, for it is constantly taking place in living bodies—both animal and vegetable.

Nollet was the first to record the occurrence of osmose. He placed a vessel, filled with alcohol and closed with a piece of bladder, inside a larger vessel which was filled with water. The rapid entry of the water almost burst the bladder; and the opposite effect took place when the water was placed inside the inner vessel and the alcohol was placed outside it. Nollet did not pursue his observations any further. Dutrochet first made careful investigations into the subject, which has since received numerous practical applications—notably in the method of dialysis, which is due to Graham. The phenomenon consists merely in the interdiffusion of two liquids complicated by the mutual molecular actions which take place between the liquids and the material of the membrane. The rate of interdiffusion depends greatly upon the nature of the membrane; sometimes the direction of the osmose is affected when the membrane is altered. The action being essentially molecular, we can readily understand how sap may be raised to great heights in plants and trees against the action of gravity; for the molecular forces in a drop of water (say) are sufficiently powerful to hold the parts of the drop together against the gravitational attraction of the whole earth.

A process which is analogous to osmose occurs in the interdiffusion of two liquids through an intervening liquid layer. The difference between the rates of diffusion of colloids and crystalloids is even more marked when the substances are separated by parchment paper or animal membrane than when they diffuse directly into each other.

Osmunda. See ROYAL FERN.

Osnabrück, a town in the Prussian province of Hanover, in the fertile valley of the Hase, 75 miles by rail SSW. of Bremen and 70 WSW. of Hanover. Its great Catholic cathedral, in the Transition style of the first half of the 13th century, is rich in relics and monuments; and the town-hall (1486–1512) contains portraits of all the plenipotentiaries who here on 24th October 1648 signed the peace of Westphalia. By that treaty the bishopric of Osnabrück, founded by Charlemagne about 810, was to be occupied alternately by a Catholic prelate and a Protestant secular prince of the House of Brunswick-Lüneburg. After having last been held by Frederick, Duke of York, the district of Osnabrück came in 1802 to Hanover, and the chapter was dissolved, until the re-establishment of the bishopric in 1857. Osnabrück has important iron and steel works, and manufactures of railway plant, agricultural machinery, gas-meters, paper, tobacco, &c. Dating from 772, it suffered much in the Thirty Years' War, but recovered, thanks to its linen industry, during the 18th century. The name *Osnaburgs* given to coarse linens in England is derived hence. Pop. (1852) 13,718; (1875) 29,850; (1885) 35,899, of whom 12,086 were Catholics. See works by Möser, by Frideri and Stüve (1816–26), and by E. Müller (1868).

Osprey (*Pandion haliaëtus*), or FISH-HAWK, a not infrequent autumnal visitor to British shores, estuaries, and lochs, where it feeds exclusively on fish. It has been known to breed in England, and several eyries still remain in Scotland. But its

Osprey (*Pandion haliaëtus*).

distribution is almost cosmopolitan, for it occurs on all the continents, especially where fish are common and men rare. The male bird is 22 inches in length, the female 24. 'The adult male has the head and nape white, streaked with brown; upper plumage umber, with a purplish tinge; under parts white, with a band of brown spots across the breast; cere, legs, and toes greenish blue.' The female has more brown on the breast. A large nest of sticks and turf, with a small moss-lined cavity for the eggs, is built on a tree or rock. The eggs (two or three) are laid in April or May, and have a 'ground colour of white or buff, with chestnut or claret blotches, and blurs of purplish gray.' In North America the osprey is gregarious. It never preys on other birds, and is not dreaded by them. It is, indeed, of a pacific and timorous disposition, and readily abandons its prey to the White-headed Eagle. In the days of falconry it was sometimes trained and used for catching fish. See Howard Saunders, *British Birds.*

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Osrhoene, a district in the north-west of Mesopotamia, containing Edessa (q.v.).

Ossa, the ancient name of a mountain on the east side of Thessaly, near Pelion (q.v.), and separated from Olympus by the vale of Tempe. The ancients placed the seat of the Centaurs and Giants in the neighbourhood of Pelion and Ossa. See TITANS.

Ossetes. See CAUCASUS.

Ossian, the great heroic poet of the Gael. In form the name is a diminutive—*Oisean*, *Oisin*, the little *os* or deer. In Gaelic story Ossian was the son of Fionn MacCumhail, a celebrated hero who flourished in the 3d century A.D. Fionn gathered about him a band of warriors like himself, who were collectively termed the *Féinn*. The adventures and exploits of these heroes, and especially of the principal figures in the group—of Fionn himself, magnanimous and wise; of his grandson Oscar, chivalrous and daring; of his nephew Diarmad, handsome and brave; of his rival Goll, the one-eyed; and Conan, the villain of the band—their jealousies, dissensions, and final overthrow constitute the literature of the Feinn. The story goes that Ossian was carried away by his fairy hind-mother to *Eilean na h-Oige*, 'the isle of the ever young,' from whence he returned betimes; and now old, blind, and alone, 'Ossian after the Feinn,' he told the story of the heroes to St Patrick.

The legends of the Feinn are but a fragment of the heroic literature of the Gael, and in the oldest MSS. the deeds of Fionn and his companions occupy but little space. There were two earlier cycles. The first of these extended from unknown antiquity until the settlement of the Gael in Ireland. The legends of this period preserve traditions of the old divinities of the race, notably the *Tuatha de Danann*, under the guise of earlier colonists whom the Gael conquered and displaced. Several tales of this cycle are preserved, among which the Fate of the Children of Tuirenn and the Fate of the Children of Lir are the best known. The second, and by far the richest, epoch in Gaelic romance is that of Cuchullin, Conall Cearnach, Fergus, and the Sons of Uisneach. The date is about the commencement of the Christian era, when Conchobar MacNessa ruled Ulster and Queen Meave ruled Connaught. The great literary product of this period is the *Tain* or Cattle Spoil of Cuailgne, the Iliad of the Gael. Another noted Saga recounts the death of the Sons of Uisneach and suicide of the Lady Deirdre, the Darthula of James Macpherson. Eventually the legends of the Feinn partly absorbed and totally eclipsed the earlier traditions; so that Ossianic literature is now but another name for the heroic literature of the Gael.

These traditions have come down from the misty past in tale and ballad. They were early reduced to writing, and as time goes on we observe great development in incident and detail. In ballads preserved in the Book of Leinster (*circa* 1150 A.D.) Ossian is represented as old and blind, surviving father and son. A 15th-century MS. recounts the boyish exploits of Fionn. As we come down, the volume of tradition gets fuller, while cycles tend to become confused. The leader of the Feinn is at one time a god, at others a hero, a king, a giant, but usually a great warrior, as wise as brave. In the book of the Dun Cow his mother is Muirn 'of the Fair Neck;' in later traditions we hear of Fionn as the son of a sister of Cuchullin; at another time a Scandinavian princess is his mother. But the literary form in which the legends are preserved remains practically unchanged. A Gaelic tale is of a distinct type—narrative prose with verse interspersed. Gaelic poetry, older and later, is ever rhymed lyric verse.

To the majority of people Ossian is known through the publications of James Macpherson (q.v.). In 1760-62-63 this remarkable man published *Fingal*, an epic poem, in six books; *Temora*, another epic, in eight books; with a number of shorter pieces, epic and dramatic—all purporting to be translations of poems composed by Ossian, the son of Fingal. 'The translation,' Dr Blair is made to say in the preface to the *Fragments* printed in 1760, 'is extremely literal.' These publications, in the opinion of the most competent judges, possessed great literary merit. They brought wealth and fame to the author, and before the end of the century a translation of them appeared in nearly every European language. Encouraged by the success that attended Macpherson's venture, other publications of a somewhat similar kind followed. In 1780 Dr Smith of Campbeltown issued a volume of *Sean Dana*, or ancient poems, 'composed by Ossian, Orran, Ullin,' &c.; and in 1787 Baron Edmund de Harold, an Irishman in the service of the Elector Palatine, printed at Düsseldorf seventeen so-called Ossianic poems in English. The genuineness of Macpherson's *Ossian* was early called in question by Dr Johnson and others. An angry controversy followed. It was maintained that Macpherson had jumbled together persons and periods to an unwarrantable extent; that his originals, so far as he had any, were not Scottish, but Irish. If this were all that could be said one would feel justified in regarding, with Professor Windisch of Leipzig, Macpherson's *Ossian* as a legitimate development of the old traditions. For the legends of the Feinn are the common property of the Gael, whether in Ireland, Scotland, or Man. They are located in Scottish topography time out of mind, and within the last four hundred years quite as rich a harvest of ballad and tale has been recovered in Scotland as in Ireland. It is no doubt absurd to represent Fionn, whom Macpherson after Barbour calls Fingal, as a mighty Caledonian monarch, at one time successfully fighting the Roman legions in the 3d century, at another assisting Cuchullin, who lived in the beginning of the 1st century, to expel from Ireland the Norsemen who made their appearance for the first time in the end of the 8th. But Macpherson had warrant in genuine tradition for mixing up names and epochs. In the 'Battle of Ventry' Fionn defeats the kings of the world. According to a Gaelic tale, his father Cumhal sets up as king of Alba, and the kings of Ireland and Scandinavia combine to effect his overthrow; while the son is ever fighting Norsemen. Zimmer has propounded the theory that the whole of these *Finnsage* are in their origin traceable to Teutonic sources, the very names by which the hero and his band are known being borrowed from the Norse. *Find*, *finn*, *Fionn* this distinguished Celtic scholar regards as a translation of *hvítr*, 'white;' while *fiann*, *féinn* are merely *fjanda*, 'foe,' later 'fiend.' Again, in genuine Gaelic ballad Fionn and Cuchullin are not directly brought together, but we find *Garbh* or the Rough, son of Starno, now fighting the latter hero, and again opposed to *Caoilte*, a distinguished companion of the former. According to some spirited verses composed in Perthshire before James Macpherson was born, the tailor of the Feinn passes, in the exercise of his calling, from the house of Goll to Dundealgan, the abode of Cuchullin, and back again to the palace of Fionn, without the least consciousness of anachronism.

But in Macpherson's *Ossian* there is a wide departure from genuine Gaelic literature and tradition. In his magnifying of the past, in his sympathy with nature, and in his powerful descriptions of the scenery of his own mountain-land James Macpherson is true to the genius of his

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people. But there he parts company with it. Gaelic literature supplies material for epics and dramas; but the epic and dramatic, as literary forms, were unknown to the people. The dim and shadowy characters of Macpherson are in sharp contrast to the clear-cut features of the Gaelic heroes. Rarely does this author make a definite statement of fact; but when he does, as when, for example, he arms the old Gaels with bows and arrows, he blunders hopelessly. Macpherson is the most vague and abstract of writers; Gaelic poets are wearisome in detail, and revel in the concrete. In the opening of Book iii. of Cathloda, the author inquires regarding the origin and issue of things; but he is indebted for his answer rather to Bishop Berkeley than to the son of Fionn.

Macpherson was not a Gaelic scholar, and the fact is considered conclusive proof of his inability to compose the Gaelic text of *Ossian*. The only Gaelic printed in the author's lifetime was *Temora*, Book vii. *Ossian* was published in all the languages of Europe before he appeared in his own. And when at length the great edition of 1807 did appear, there were Gaelic texts for only one-half of the poems, and for about three-fourths of the matter published by Macpherson in English forty-five years previously. For the others, no 'original,' ancient or modern, has ever yet been found. And it must be allowed that this truncated *Ossian* does not show to advantage in his native garb. The Gaelic-speaking people have never known him. There is not a single line of these Gaelic texts which can be proved to have been committed to writing before Macpherson's day. The diction is essentially modern. The loan-words are numerous, several of them borrowed from English. The idioms and constructions are colourless, and show traces of classical training rather than of the turns of phrase characteristic of native authors. The so-called blank verse in which the poems are written is unknown to Gaelic poetry. The archaic orthography of the seventh book of *Temora* was adduced by Dr Clerk of Kilmallie as proof of the antiquity of the writing. But in his frequent use of the *tenues* (*c*, *p*, *t*), instead of the *mediæ* (*g*, *d*, *b*), Macpherson merely followed Alexander Macdonald, who published his own poems twelve years previously. By the same gifted man he was led into the blunder of making *grian*, 'sun,' a masculine noun, contrary to invariable Gaelic usage, which has the sun as well as the moon of the feminine gender.

The truth seems to be that these so-called translations were essentially the compositions of James Macpherson, and that the Gaelic texts were prepared with or without aid from his friends, but how and when we do not now know. The only man who could explain things died and made no sign. One regrettable consequence of this famous episode in the history of Gaelic literature still remains. To many persons the discrediting of James Macpherson means the blotting out of existence of an extensive and interesting literature —the heroic literature of the Gael.

See the *Poems of Ossian* (1762–63); Brooke's *Reliques of Gaelic Poetry* (1789); *Ossian* (1807); *Transactions of the Ossianic Society of Dublin* (6 vols. 1854–61); *Popular Tales of the West Highlands* (1860–62); *Dean of Lismore's Book* (1862); Clerk's *Ossian* (1870); *Leabhar na Féinne* (1872); *Folk and Hero Tales from Argyllshire* (1890); Windisch, *Irische Texte* (1880); *Ztschr. für deutsches Alt.*, vol. liii.; *Academy*, February 1891.

Ossification, or the formation of bone, takes place in the growth of the normal human skeleton in two distinct ways. The vast majority of the bones are first represented by cartilage, which, by a complicated series of changes, becomes transformed into bone. The bones of the vault of the cranium and the face, part of the clavicle, and the 'sesamoid' bones occurring in tendons, on the other hand, are developed from fibrous tissue, without passing through a cartilaginous stage, and are distinguished as *membrane-bones*. In the larger bones of the limbs at least three *centres of ossification* are found, one in the shaft, and one at each extremity. Growth of the bone takes place mainly at the lines between these elements, which long remain cartilaginous. Bony union becomes complete in each situation at a tolerably definite age (in some not till about twenty-five; see BONE). *True Ossification* sometimes occurs as a morbid process; but in many cases the term is incorrectly used (especially in the case of blood-vessels—see under ARTERIES) to designate a hard calcareous deposit, better called *calcification*, or *calcareous degeneration*, in which the characteristic microscopic appearances of true bone are absent. In one sense the osseous tissue that is formed in regeneration of destroyed or fractured bones (see FRACTURES) may be regarded as due to a morbid, although a restorative action. Hypertrophy of bone is by no means rare, being sometimes local, forming a protuberance on the external surface, in which case it is termed an *exostosis;* and sometimes extending over the whole bone or over several bones, giving rise to the condition known as *hyperostosis*. Again, true osseous tissue occasionally occurs in parts in which, in the normal condition, no bone existed, as in the dura mater, in the so-called permanent cartilages (as those of the larynx, ribs, &c.), in the tendons of certain muscles, and in some forms of tumours. The peculiar causes of the osseous formations which are unconnected with bone are not known.

Ossoli. See FULLER (SARAH MARGARET).

Ossory, a diocese of the Roman Catholic Church of Ireland, embraces the county of Kilkenny and parts of King's and Queen's Counties. The bishop has his cathedral at Kilkenny. There is an Ossory parliamentary division in Queen's County.

Ostade, ADRIAN, painter and engraver, was born at Haarlem in December 1610, and in that city he died, 27th April 1685. His teacher was Franz Hals. Country dancing-greens, farm-yards, stables, the interiors of rustic hovels and houses, and beer-shops are the places which he loves to paint; and his persons are for the most part coarse peasants, ugly, sordid, dirty, ragged. Vigour and close observation, with skilful management of lights, are perhaps his most noticeable characteristics; and humour and poetic appreciation are not unfrequently present. About 1639 he fell under the influence of Rembrandt's style. He was a prolific painter, and his works are to be found in the museums and collections of the Netherlands, Germany, Austria, Russia, France, and England. See a work by Bode (Vienna, 1881).—ISAAC OSTADE, brother of Adrian, also a painter, was born at Haarlem in 1621, and died at Amsterdam in 1649. Until 1644 he worked in the style of his brother, but then struck out a path for himself, and excelled in roadside scenes, winter landscapes, village street life, and similar subjects.

Ostashkoff, a town of Russia, stands on the south-east of Lake Seliger, 107 miles W. by N. of Tver. It is one of the chief centres in Russia for the making of boots and shoes. Pop. 9905.

Ostend, a fashionable watering-place in the Belgian province of West Flanders, on the German Ocean, 77 miles by rail WNW. of Brussels. Its *Digue*, or sea-wall, 3 miles long, 40 feet high, and 35 yards broad, forms a favourite promenade, as also do the two *Estacades*, or wooden piers, projecting on both sides of the harbour's entrance. Two spacious floating basins for the Dover mail-

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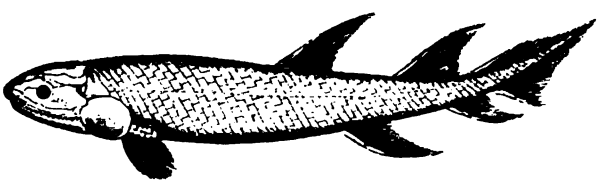
packets (a four hours' passage) were completed in 1874; and as a station also for London steamers, and the terminus of various lines of railway, Ostend is a lively and active place of transport traffic (butter, rabbits, oysters, &c.), and the resort in the season (July to September) of 16,000 to 20,000 visitors from Germany, Russia, and all parts of the Continent. It is, moreover, an important fishing-station, and has a good school of navigation, a handsome Cursaal (1878), a hôtel-de-ville (1711), a fish-market, and a lighthouse (1771; 175 feet). The manufactures include linen, sail-cloth, candles, and tobacco. Pop. (1874) 16,533; (1889) 24,125. Dating from 1072, Ostend is memorable for the protracted siege by the Spaniards which it underwent from 7th July 1601 to 20th September 1604. Twice again it surrendered—to the Allies in 1706, and to the French in 1745. The fortifications have been demolished since 1865.—The 'Ostend Manifesto,' in American history, was a despatch forwarded to the United States government in 1854 by its ministers at the courts of Great Britain, France, and Spain, who had met here, by the government's request, to discuss the Cuban question. The despatch declared that, if Spain would not sell Cuba, self-preservation required the United States to take the island by force, and prevent it from being Africanised like Hayti. Nothing, however, came of the 'manifesto.'

Ostensory. See MONSTRANCE.

Osteol'epis (Gr., 'bone-scale'), a genus of fossil ganoid fish peculiar to the Old Red Sandstone. It is characterised by smooth rhomboidal scales, by numerous sharply-pointed teeth, and by



Osteolepis.

having the two dorsal and anal fins alternating with each other. The body is long and slender.

Osteology. See BONE, SKELETON, &c.

Osterode, a town of Hanover, at the western base of the Harz Mountains, on the Söse, an affluent of the Leine, 30 miles by rail NW. of Nordhausen. Its church of St Giles (724; rebuilt 1578) contains the graves of the dukes of Grubenhagen, and there are also a fine town-hall, baths, large grain-stores, and cotton, woollen, and linen factories. Pop. 6435.—OSTERODE, in East Prussia, on the Drewenz, 77 miles NE. of Thorn, has a castle of the Teutonic knights (1270) and iron manufactures. Pop. 7123.

Ostia, a city of Latium, at the mouth of the Tiber, 14 miles SW. of Rome. It is said to have been founded by Ancus Martius, and was regarded as the oldest Roman colony. It first acquired importance from its salt-works, and afterwards as the port where the Sicilian, Sardinian, and African corn shipped for Rome was landed; but its name first occurs during the second Punic war. It was long, too, the principal station of the Roman navy; but its harbour was exceedingly bad, and gradually the entrance became silted up, so that vessels were compelled to discharge their cargoes in the open roadstead. At length, towards the middle of the 1st century A.D., the Emperor Claudius dug a new harbour or basin, 2 miles to the north, and connected it with the Tiber by a canal. It was named the *Portus Augusti*, and around it soon sprang up a new town called *Portus Ostiensis*, *Portus Urbis*, *Portus Romæ*, and often simply *Portus*. Yet it was not till nearly the close of the Roman empire that the prosperity of Ostia as a city began to decline. It was, however, a mere ruin in 830, when Gregory IV. founded a village—the modern Ostia—half a mile above the ancient one, whose 100 inhabitants still carry on the manufacture of salt. The ruins of Ostia extend for a mile and a half along the Tiber, and are nearly a mile in breadth. Excavations were commenced in 1783, and have been carried on systematically since 1855. See MITHRAS.

Ostiaks, or OSTYAKS, a Ural-Altaic people living along the lower course of the river Ob in western Siberia, where they struggle against chronic poverty, drunkenness, frequently famine, to get a living by fishing and hunting fur-bearing animals. They dwell in wretched and very dirty huts, eat flesh raw, use bows and arrows, and weapons of bone and stone; and are still in great part heathens. They are decreasing in numbers, and are estimated now at 27,000. Their language belongs to the Finnish division.

Ostmen, or EASTMEN. See NORTHMEN.

Ostracion. See COFFER-FISH.

Ostracism, a right exercised by the people of Athens of banishing for a time any person whose services, rank, or wealth appeared to be dangerous to the liberty of his fellow-citizens, or inconsistent with their political equality. It was not a punishment for any particular crime, but rather a precautionary measure to remove such leaders as were obviously exercising a dangerous ascendency in the state. Ostracism was introduced by Cleisthenes about the beginning of the 6th century B.C., after the expulsion of the Pisistratidæ. The people were annually asked by the Prytanes if they wished to exercise this right, and if they did a public assembly (*ecclēsia*) was held, and each citizen had opportunity of depositing, in a place appointed for the purpose, a potsherd (*ostrakon*, also 'oyster-shell') or small earthen tablet, on which was written the name of the person for whose banishment he voted. Six thousand votes were necessary for the banishment of any person; but the greatest men of Athens—Miltiades, Themistocles, Aristides, Cimon, and Alcibiades—were subjected to this treatment. The banishment was at first for ten years, but the period was afterwards restricted to five. Property and civil rights or honours remained unaffected by it. Alcibiades succeeded in obtaining the final abolition of ostracism, of which, however, Plutarch and Aristotle speak as a necessary political expedient, and its utility has been very ably defended in modern times by Grote (*History of Greece*, vol. iv.).

Ostracoda. See CYPRIS, CRUSTACEA.

Ostrich (*Struthio*), a genus of birds which was once included with the cassowaries, emu, rhea, and apteryx in a distinct order, the Ratitæ, but which is probably better regarded as forming a family apart. Fürbringer thus places it; its nearest allies appear to be the rheas of South America. There seem to be two species of ostrich—viz. *Struthio camelus* and *S. molybdophanes;* the differences which distinguish them are not great. The ostrich is the largest existing bird, reaching a height of from six to eight feet. As in the other 'struthious' birds (= Ratitæ), the wings are somewhat rudimentary and quite useless as organs of flight; but the bird spreads them out when running, and they appear to act as sails. The breastbone or sternum has no keel—that is, no median ridge to which the great pectoral muscles

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in other birds are so largely attached; in the ostrich these pectoral muscles are but slightly developed, which fact is of course in relation to its small wing. The absence of the sternal keel was the chief reason which led to the association of all the struthious birds into one order, and the name of this order—Ratitæ—emphasised the character, signifying raft-like, as opposed to Carinatæ or keeled. The ostrich is now confined to Africa, Arabia, and Syria, but the discovery of its fossil remains in India indicate that it formerly had a much wider range.

The ostrich shuns the presence of man, but is often to be seen in near proximity to herds of zebras, quaggas, giraffes, antelopes, and other quadrupeds. It is gregarious, although the flocks of ostriches are not generally very large. It is polygamous, one

Ostrich (*Struthio camelus*).

male usually appropriating to himself, when he can, from two to seven females, which seem to make their nest in common, scooping a mere hole in the sand for this purpose. Each female is supposed to lay about ten eggs. The eggs are all placed on end in the nest, which often contains a large number, whilst around it eggs are generally to be found scattered on the sand. Concerning these, it has been supposed that they are intended for the food of the young birds before they are able to go in quest of other food; an improbable notion, not supported by evidence. It seems at least as likely that these scattered eggs are laid by females waiting whilst the nest is occupied by another, and that they are lost to the ostriches, and no more regarded. Contrary to a very generally received opinion, the ostrich does not leave her eggs to be hatched entirely by the heat of the sun; nor is it the case, as has been alleged, that the male only incubates. Both parents give their assistance in the task of watching the eggs. The male and female sit alternately on the eggs for six weeks; the cock sitting all the night, but the female helping in the daytime.

The ostrich feeds exclusively on vegetable substances, its food consisting in great part of grasses and their seeds; so that its visits are much dreaded by the cultivators of the soil in the vicinity of its haunts, a flock of ostriches soon playing terrible havoc with a field of corn. The ostrich swallows large stones, as small birds swallow grains of sand, to aid the gizzard in the trituration of the food; and in confinement it has often been known to swallow very indiscriminately whatever came in the way—pieces of iron, bricks, glass, old shoes, copper coins, &c. Its instincts do not suffice to prevent it from swallowing very unsuitable things; copper coins were fatal in one instance, and a piece of a parasol in another.

The speed of the ostrich, when it first sets out, is supposed to be not less than sixty miles an hour; but it does not seem to be capable of keeping up this speed for a long time. It is successfully hunted by men on horseback, who take advantage of its habit of running in a curve, instead of a straight line, so that the hunter knows how to proceed in order to meet it and get within shot. It is often killed in South Africa by men who envelop themselves in ostrich-skins, and, cleverly imitating the manners of the ostrich, approach it near enough for their purpose, without exciting its alarm, and sometimes kill one after another with their poisoned arrows. The strength of the ostrich is such that it can easily carry two men on its back. Its voice is deep and hollow, not easily distinguished, except by a practised ear, from the roar of the lion; but it more frequently makes a kind of cackling, and, when enraged and striking violently at an adversary, hisses very loudly. The flesh of the ostrich is not unpalatable when it is young, but rank and tough when old. It is generally believed to have been prohibited as unclean to the Jews (Lev. xi. 16), although the name is translated *owl* in the English Bible. There are frequent references to it in the Old Testament.

The eggs of the ostrich, which are white or yellowish white in colour, are much esteemed as an article of food by the rude natives of Africa, and are acceptable even to European travellers and colonists. Each egg weighs about three pounds, and is thus equal to about two dozen ordinary hen's eggs. The egg is usually dressed by being set upright on a fire, and stirred about with a forked stick, inserted through a hole in the upper end. The thick and strong shell is applied to many uses, but particularly is much employed by the South African tribes for water-vessels. The reader will probably recollect the interesting plate in Livingstone's *Travels* of women filling ostrich-shells with water. In taking ostrich-eggs from the nest the South African is careful not to touch any with the hand, but uses a long stick to draw them out, that the birds may not detect the smell of the intruder, in which case they would forsake the nest; whilst otherwise they will return, and lay more eggs. The long plumes of the ostrich have been highly valued for ornamental purposes from very early times, and continue to be a considerable article of commerce (see below; also FEATHERS). The ostrich is often to be seen in Britain in confinement, and readily becomes quite tame and familiar, although still apt to be violent towards strangers. Great numbers were exhibited in the public spectacles by some of the Roman emperors; and the brains of many ostriches were sometimes presented in a single dish, as at the table of Heliogabalus. See the articles CASSOWARY, EMU, RHEA; also ÆPYORNIS, DINORNIS.

OSTRICH-FARMING.—Although there were isolated attempts in 1864, the domestication of the ostrich in South Africa, for the sake of its plumage, dates from about 1867, and so rapidly had the industry grown that in 1880 about £8,000,000 of capital was employed, and the value of feathers exported was over £800,000. The French have also made attempts in the same direction in Algiers; feathers are exported from Tripoli; there are tame birds kept in Egypt; while birds have been imported into Australia by the Melbourne Acclimatisation Society, and a shipment was made from Capetown to Buenos Ayres in 1882. Successful experiments in ostrich-farming have also

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been made in several places in California. Mr Kinnear of Beaufort-West, and Mr Arthur Douglass of Heatherton Towers, near Grahamstown, were two pioneers in ostrich-farming. Large fortunes were made in the early days of the industry, when feathers were worth £100 per lb., the plumes of one bird sometimes fetching £25. As much as £400 or even £500 have been paid for a good pair of breeding birds, and chicks newly out of the egg have fetched £10 each. As the supply became greater than the demand a pair of ostriches might not bring more than £12, and the plumes of an ostrich about 30s. for one plucking. The beautiful white plumes so highly prized by ladies all over the world grow in the ends of the wings of the male birds. A good bird in his prime will yield from twenty to forty of these, besides a few black feathers also from the wings. The tail-feathers are not nearly so valuable nor so beautiful. The plumes of the hen from her wing-tips are generally spotted and flecked with gray, and are called feminines. From 120 to 130 good feathers go to a pound: they are always thus sold by weight. Ostrich-farmers either may buy the young birds from the breeders when from four to twelve months old, keep them for the sake of their feathers, and sell them as breeding birds when they are four years of age; or they may give their attention to breeding birds only, selling the young as they are hatched or when they are a few months old; or they may breed and farm for themselves. Where artificial incubators are in use the eggs are removed from the nest as soon as laid. Till a year old birds are usually treated as chicks, and fed with 1 lb. each of wheat, barley, or Kaffir corn; when the weather is wet they must be put under cover. After this age they may be put in a fenced camp, with ten acres to each bird, and left to shift for themselves. Still, they need to be watched for two years, as they suffer much from parasites. There may be a fortnightly muster, and a stock-book kept, in which the days for cutting and pulling feathers are noted. A five-wire fence is recommended by some breeders, never less than 4 feet 9 inches in height. The 'plucking-box' is a solid wooden box, in which the ostrich has only room to stand. The feathers are cut before the quills are quite ripe; the stumps remain for a month or two, and are then easily pulled out. Formerly the feathers used to be pulled out by the roots. The first crop of good feathers is clipped at seven or eight months; this is repeated every eight months with like result, till the birds take to breeding, after which it is not desirable to deprive them of their feathers, as they require them to cover the eggs on the nest. The bird's plumage has reached perfection when three years old, and at four years the birds have reached maturity. The bony body of the ostrich yields little or no flesh, but the thigh makes delicious soup. The legs are brittle and easily broken, in which case the bird has to be killed. Ostriches may be kept in every part of Cape Colony except in the cold mountainous tablelands, but they thrive best in the extensive Karroo plains, which are their natural habitat, though strong adult birds may thrive in a good grass country. They prefer a dry, warm, well-drained Karroo country, and the wider the range the birds can be allowed the better they thrive. Their best grazing grounds are where the soil is rich in alkalies. In 1885 the export of feathers from the Cape of Good Hope amounted to 232,119 lb., of a value of £900,165; in 1889 to 147,486 lb., of a value of £404,091.

See Mosenthal and Harting's *Ostriches and Ostrich-farming* (1876); Douglass, *Ostrich-farming in South Africa* (1881); Martin's *Home Life on an Ostrich-farm* (1890).

Ostrog, a town of Russia, in Volhynia, 176 miles W. of Kieff. Pop. 16,522, mostly Jews.

Ostrogoths. See GOTHS.

Ostuni, a city of South Italy, 22 miles NW. of Brindisi by rail. Pop. 15,199.

Osuna, a town of Spain, 66 miles by rail ESE. of Seville, stands in a fertile plain on a triangular hill crowned by the castle of the Giroms, dukes of Osuna, and by a collegiate church (1534), which was pillaged by Soult of 5 cwt. of ancient church plate. Pop. 17,211.

Oswald, ST, king of Northumbria, was the son of the conquering Ethelfrith of Bernicia and of Acha, sister of the brave Edwin of Deira. He fought his way to the throne by the defeat, at Heavenfield near Hexham (635), of Cædwalla the Welsh king who had aided Penda to crush Edwin at Hatfield two years before. Under the reign of Edwin he had found shelter in Scotland, and been converted to Christianity at Hii or Iona; and now, when he was hailed king by the whole of Northumberland, he established Christianity with the help of St Aidan, who settled on Holy Island. Oswald was acknowledged as over-lord by all the kingdoms save those subject to Penda. He fell fighting against his enemy at Maserfield (Oswestry) in 642.

Oswego, a port of entry and capital of Oswego county, New York, is situated at the mouth of Oswego River (here crossed by three bridges), on Lake Ontario, at the extremity of the Oswego Canal (to Syracuse, 35 miles by rail), and 326 miles by rail NW. of New York City. It is a handsome city, with wide streets, and a United States government building, court-house, city hall, state armoury, &c. It is the principal port on the lake, with a breakwater, a dozen large elevators, and 4 miles of wharves, and carries on a brisk trade. The river falls here 34 feet, and the abundant water-power is utilised in flour-mills, knitting-mills, &c. Oswego starch and corn-flour are as well known in Europe as in America. Pop. (1880) 21,116; (1890) 21,842.

Oswego Tea, a name given to several species of Monarda, particularly *M. purpurea*, *M. didyma*, and *M. kalmiana*, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. They belong to the natural order Labiatæ, somewhat resemble mints in appearance, and have an agreeable odour. The infusion is said to be useful in intermittents and as a stomachic. Some other species of Monarda are used in the same way, and the three species named are not uncommonly cultivated in gardens for ornament.

Oswestry, a thriving market-town and municipal borough (1397) of Shropshire, 18 miles NW. of Shrewsbury. It has an old parish church, restored in 1872 at a cost of £10,000; a fragment of the Norman castle of Walter Fitzalan, progenitor of the royal Stewarts; and a 15th-century grammar-school, rebuilt in 1810 and enlarged in 1863–78. Railway workshops were established in 1865, and sewerage and water works constructed in 1866. Oswestry derives its name from St Oswald (q.v.), who was slain here. In 1644 it was captured by the parliamentarians. Pop. (1851) 4817; (1891) 8496. See works by Price (1815) and Cathrall (1855).

Osymandyas, the name of a great king of Egypt, mentioned by Diodorus and Strabo, who reigned, according to these authors, as the 27th successor of Sesostris. He is said to have distinguished himself by his victories, to have invaded Asia with an army of 400,000 men and 20,000 cavalry, and to have conquered the Bactrians, who had been rendered tributary to Egypt by Sesostris. In honour of this exploit he is said by Hecatæus to have erected a monument which was at once a palace

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and a tomb, and which, under the name of *Osymandeion*, was renowned for its size and splendour in later times. The Osymandeion is generally believed to be represented by the extant ruins of the Rameseum at Medinet Habu (see THEBES), though great difficulty has been felt in reconciling the descriptions of its magnificence in ancient writers with the dimensions of the existing relic. Nor can the name of Osymandyas be recognised amongst the Egyptian kings.

Otago, the most southern provincial district of New Zealand, in the South Island. It was one of the original six provinces in the colony, but since 1876 these have been abolished and the county system has been adopted. The name is said to be derived from the Maori *Otakou*, 'red earth.' It was colonised in 1848 by the Otago Association connected with the Free Church of Scotland. It is bounded on the N. by Canterbury and Westland, and on the E. and W. by the sea. It has a coast-line of 400 miles, is 160 miles long by 195 broad, the estimated area comprising 15,038,300 acres, of which 9 millions, chiefly in the centre and in the east, are fit for agriculture. Pop. (1880) 138,219; (1891) 153,005. Gold was discovered here in 1861, and now the goldfields comprise an area of 2½ millions of acres, from which gold to the value of £18,000,000 had been exported up till 1888. Dunedin (q.v.) is the capital. See NEW ZEALAND.

Otaheite. See TAHITI.

Otalgia (Gr. *ot-*, 'the ear,' and *algos*, 'pain') is neuralgia of the ear. See EAR.

Otary (*Otaria*), a genus of the Seal family (Phocidæ). See SEA-LION.

Otchakoff, a seaport of Russia, stands on the north shore of the estuary of the Dnieper, 38 miles ENE. of Odessa. It occupies the site of the ancient *Alector*, and has beside it the ruins of the once important Greek colony of Olbia. In 1492 the khan of the Crimea built here a strong fortress, which was taken by the Russians under Münnich in 1737, recovered in 1738, and again captured after a long siege by Potemkin in 1788, and definitively annexed by Russia. After it had been bombarded by the Allied fleet in 1855 the Russians demolished the fortifications. In 1887 a ship-canal was opened here, which makes the estuary of the Bug and Dnieper much more easily accessible to large ships. Pop. 6977.

Othman, or **Osman I.,** surnamed *Al-ghazi* ('the conqueror'), the founder of the Ottoman (Turkish) power, was born in Bithynia in 1259, and, on the overthrow of the sultanate of Iconium in 1299 by the Mongols, seized upon a portion of Bithynia. Then he forced the passes of Olympus, took possession of the territory of Nicæa, except the town of that name, and gradually subdued a great part of Asia Minor, and so became the founder of the present Turkish empire. From his name are derived the terms Ottoman and Osmanli as synonyms for the Turks. See TURKEY.

Othman, third calif. See CALIF.

Otho, MARCUS SALVIUS, Roman emperor for the first three months of 69 A.D., was descended from an ancient Etruscan family, and was born in 32 A.D. He was a favourite companion of Nero, who sent him as governor to Lusitania for his refusal to divorce his beautiful wife, Poppæa Sabina. Here he remained ten years, and ruled with wisdom and moderation. He joined Galba in his revolt against Nero (68), but, disappointed in his hope of being proclaimed Galba's successor, marched at the head of a small band of soldiers to the forum, where he was proclaimed emperor, and Galba was slain. Otho was recognised as emperor over all the Roman possessions, with the exception of Germany, where a large army was stationed under Vitellius, which at once began to march on Italy under the command of the lieutenants Valens and Cæcina. Otho showed vigour in his preparations, but his forces were completely defeated after an obstinately fought battle near Bedriacum. Next day, though things were still far from desperate, Otho set his house in order, and then stabbed himself, 16th April 69.

Otho I., or OTTO THE GREAT, son of the Emperor Henry I. of Germany, was born in 912, and was, on the death of his father in 936, formally crowned king of the Germans. His reign was one succession of eventful and generally triumphant wars, in the course of which he brought many turbulent tribes under subjection, acquired and maintained almost supreme power in Italy, where he imposed laws with equal success on the kings of Lombardy and the popes at Rome, consolidated the disjointed power of the German emperors, and established Christianity at many different points in the Scandinavian and Slavonic lands, which lay beyond the circuit of his own jurisdiction. He died in 973.

Otis, JAMES, American statesman, was born at West Barnstable, Massachusetts, 5th February 1725, graduated at Harvard in 1743, practised law, and became a leader of the Boston bar. He was advocate-general in 1760, when the revenue officers demanded his assistance in obtaining from the superior court general search-warrants allowing them to enter any man's house in quest of smuggled goods. Otis, however, refused, resigned his position, and appeared for the people; and his speech, which took five hours in delivery, produced a great impression—John Adams afterwards declared that 'the child Independence was then and there born.' When the writs were granted, by the direction of the home authorities, in 1761, Otis was elected to the Massachusetts assembly; and he afterwards was prominent in firm resistance to the revenue acts. In 1769 he was savagely beaten by some revenue officers and others, and as a result of a sword-cut on the head he lost his reason. On 23d May 1783 he was killed by lightning. The publication on which his fame chiefly rests is *The Rights of the Colonies Asserted and Proved* (1764), a powerful and fearless defence of their right to control their own public expenditure. See the Life by W. Tudor (Boston, 1823).

Otitis, inflammation of the tympanic cavity of the ear. See EAR.

Otley, a market-town in the West Riding of Yorkshire, on the right bank of the Wharfe, and at the north base of Otley Chevin (925 feet), 10 miles NW. of Leeds. Its church, restored in 1868–69, is mainly Perpendicular, but has fragments of Saxon and Norman work; and there are also a court-house (1875), a mechanics' institute (1869), and a grammar-school (1602). Machine-making is the principal industry, with worsted and leather manufactures. Pop. (1851) 4422; (1891) 7838.

Otocyon. See DOG.

Otoliths. See EAR, Vol. IV. p. 157; FISHES, p. 652.

Otorrhœa, a purulent or muco-purulent discharge from the external ear. See EAR.

Otranto (the ancient *Hydruntum*), a town in the extreme south-east of Italy, 29 miles by rail SE. of Lecce, and on the Strait of Otranto, 45 miles from the coast of Albania on the opposite side. During the later period of the Roman empire, and all through the middle ages, it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece—having in this respect supplanted the famous Brundusium of earlier times; but its port is now in decay. In

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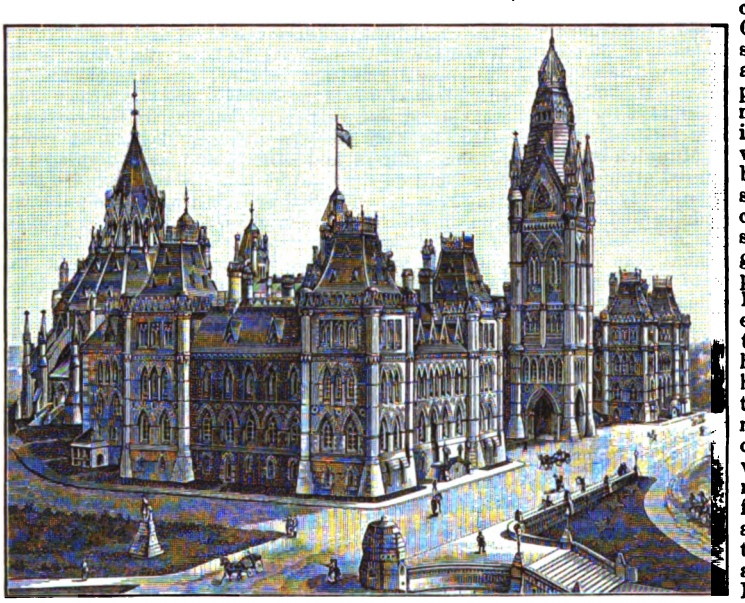
1480 it was taken by the Turks. At the present day its castle, which gives the title of Horace Walpole's well-known story, is in the same condition as its port. The town is the seat of an archbishop, and has a cathedral, restored after the siege by the Turks, with fine mosaics and an ancient crypt. Pop. 1893. In the province of Lecce (formerly called Terra di Otranto) many Albanians have long been settled. For the Duke of Otranto, see FOUCHÉ.

Otta'va Rima. See METRE.

Ott'awa, one of the largest rivers of British North America, rises nearly 300 miles due north of Ottawa city, flows west to Lake Temiscamingue, some 300 miles, and thence 400 miles south-east, and falls into the St Lawrence by two mouths, which form the island of Montreal. Its drainage basin has an area variously estimated at from 60,000 to 80,000 sq. m. During its course it sometimes contracts to 40 or 50 yards; elsewhere it widens into numerous lakes of considerable size. It is fed by many important tributaries, the chief of which are the Petewawa, Bonnechère, Madawaska, and Rideau on the right, and the Coulonge, Gatineau, and Rivières du Lièvre and du Nord on the left side. These, with the Ottawa itself, form the means of transit for perhaps the largest lumber trade in the world. The passage of timber over falls and rapids has been greatly facilitated by the construction of dams and slides. See next article.

Ottawa, the capital of the Dominion of Canada, is situated upon the south bank of the Ottawa River, 120 miles from its influx into the St Lawrence at Montreal. The river Ottawa drains a vast stretch of country as far north-west as Lake Nipissing and beyond; all the lumber-products of this district, as well as all the local trade, are carried down to Ottawa, to the point at which the river forms the splendid Chaudière Falls (200 yards wide and 40 feet high). These falls, above which a suspension bridge spans the river, supply the motive-power for the numerous lumber-mills, flour-mills, factories, &c. To the east of the city the river Rideau forms a second fall, which, although inferior to the Chaudière, supplies further motive-power. The Rideau Canal, which was made in 1827, passes through the centre of the city, and affords connection with the Rideau Lakes, and so with the great lakes beyond. Opposite the city, to the north-east, the Gatineau River joins the Ottawa and affords further lumbering facilities. A few miles to the east, the Du Lièvre River opens up a rich phosphate country, which is being much worked. The industries of Ottawa are mostly connected with lumber. In the winter thousands of men are engaged in cutting timber and drawing it to the streams, and in the spring the freshets carry down to the mills the rafts, on which the men who cut it live and labour during the passage. The cut of timber in the Ottawa Valley in 1889 was estimated at 720,000,000 feet. Flour, iron wares, bricks, leather, and matches are, however, manufactured. The exports of the city in 1889 amounted to $3,562,518, the imports to $1,984,928.

The parliamentary buildings, constructed in the Italian Gothic style after 1860, when the Prince of Wales laid the foundation-stone, are placed on a noble bluff on the bank of the Ottawa. These structures, including the handsome library building and the Victoria Tower (180 feet high), cost altogether about $8,000,000. The residence of the governor-general—an old-fashioned, ugly building, called Rideau Hall—is situated about a mile from the city. The post-office, city hall, banks, and telegraph-offices are all of stone and handsomely built. The churches are numerous, but not splendid in architecture. Ottawa is the place of residence of the bishop of Ontario (Church of England), and of the Roman Catholic bishop of Ottawa, who has a cathedral here. The Roman Catholics have separate schools; the Protestants attend almost universally the public schools. There are a normal school and a collegiate institute, both public, and a very large college conducted by the Oblate Fathers; besides a ladies' college, a musical academy, and an art school. A well-equipped geological museum and the parliamentary library, with 140,000 volumes, add to the educational advantages of the city. There are several hospitals and a variety of homes for the poor. Besides the rivers and canals already mentioned, Ottawa stands on the Canada Pacific Railway, which runs along the north bank of the Ottawa from Montreal and crosses by a bridge into Ottawa; whilst the Grand Trunk Railway and the Canada Atlantic Railway connect the city with the Intercolonial Railway on the east, and with the Canada Pacific Transcontinental line. Ottawa is governed by a mayor and corporation. The taxes are high, and the streets, partly owing to the climate, are bad; but the city is generally healthy. The city was begun in the last years of the 18th century by a settler named Wright, of Boston, Massachusetts, who built himself a residence near the Chaudière, and called the village which he founded Hull. Hull now contains 12,000 inhabitants, mainly French-Canadians, engaged in the lumber trade. The southern bank lots, on which Ottawa now stands, were sold by Wright to one Sparks, who took them reluctantly in payment



Canadian Parliament Buildings, Ottawa—The Main Building.

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for labour. In 1823 Colonel By was sent by the British government to survey the Rideau Canal. The construction of the canal (1827) stimulated the settlement, which was called Bytown. In 1854 its name was changed to Ottawa, and the town was created a city. In 1861 the population was 15,000; in 1871, 21,545; in 1881, 27,412; and in 1891 it was estimated at 35,000 (about one-half Roman Catholics); to these may be added about 15,000 in adjoining villages and suburbs. In 1858 Ottawa was chosen as the administrative capital of Canada. The first parliament met here in 1865.

Ottawa, (1) capital of La Salle county, Illinois, at the confluence of the Fox and Illinois rivers, which are here crossed by five bridges, 82 miles by rail WSW. of Chicago. It has a mineral spring rich in bromine and iodine, six glass-furnaces, and manufactures of flour, cutlery, tiles, fireproofing, organs, and pianos. Pop. 9834.—(2) Capital of Franklin county, Kansas, on the Osage River (crossed here by two bridges), 68 miles by rail SW. of Kansas City. It contains a college, a foundry, and railway-shops, and manufactures flour, furniture, carriages, and soap. Pop. 6626.

Otter (*Lutra vulgaris*), an aquatic carnivore in the family Mustelidæ, which also includes the badgers and weasels. It is type of a widely distributed genus with about twenty reputed species, like one another in their diving and swimming powers, in their fish-diet, in the webbing of the feet, and in the brown colour of the short, close fur. In the common species, distributed through Europe and Asia, the body may attain a length of 2½ feet, and the tail half as much; the head is broad and flat, with short, rounded ears; the blunt snout bears lateral slit-like nostrils, closed during diving; the long body is covered with beautiful chestnut fur; the legs are very short, but strong; the feet

Fig. 1.—Otter (*Lutra vulgaris*).

are clawed as well as webbed. The otter lives in a hole by the stream side, and feeds especially on fish, but also on small mammals, birds, frogs, crayfishes, &c. In strength and agility, keen scent and hearing, and general astuteness it deserves a high rank among mammals. Its life is solitary except at the pairing season in spring, after which the female gives birth to three or four blind young, which she guards with great care till they are able to look after themselves. Being very destructive to fishes, the otter has been much hunted, and is now rare where it once abounded. Izaak Walton gives a lively description of an otter-hunt, and tells us that the 'fish-beast will walk upon land sometimes five or six, or ten miles in a night,' that 'he devours much fish, and kills and spoils much more,' that 'he can smell a fish in the water one hundred yards from him,' that 'his skin is worth ten shillings to make gloves,' while 'his stones are good against the Falling-sickness.' The flesh is tasty, and, being for practical purposes that of a 'fish,' is allowed during fasts. The young may be tamed and used for fish-catching.

Among the other species the most remarkable is the large *L. sandbachii*, from Demerara and Surinam; while of related genera the most striking is the Sea-otter (*Enhydra lutris*), from the North Pacific. This is a powerful otter, sometimes 4 feet long and 90 lb. in weight, with massive molars, by which it is said to crush molluscs and crabs as well

Fig. 2.—Sea-otter (*Enhydra lutris*).

as fish. Its fur is valuable, and the animal is consequently becoming rare. Steller, who was shipwrecked on Behring Island in the middle of the 18th century, has beautifully pictured the life of this interesting otter, but its habits have now become much more shy and wary, and measures have had to be taken to prevent its extermination. The most common otter of North America is *L. canadensis*, much larger than the European species, and ranging throughout the continent, though rare in settled districts.

Otter-hunting is practised in the early morning, and at a season when all other hunting is drawing to a close. The huntsmen are armed with spears; and the true otter-hound, seen best in the Carlisle pack, is a bold, hardy, rough-coated dog, nearly two feet high at the shoulder. Foxhounds are sometimes used.

Otterburn, a small village in Redesdale, Northumberland, about 16 miles south of the Border, and 32 miles from Newcastle, on the benty uplands a little to the west of which was fought, during the moonlit night of 19th August 1388, what Froissart calls 'the hardest and most obstinate battle that was ever fought.' Of a Scottish army of 50,000 men which had mustered on the Border, the greater part invaded England by Carlisle, while 2000 foot and 300 lancers under the Earls of Douglas, Dunbar, and Moray remained to carry fire and sword through Northumberland and Durham. On the march back, laden with spoil, they lay three days before Newcastle, and in one of the frequent passages of arms that occurred Douglas carried away Hotspur's pennon, and declared that he would plant it on his castle of Dalkeith. 'By God, Earl of Douglas,' said Hotspur, 'you shall not even bear it out of Northumberland.' The Scots marched up Redesdale, and, after failing in an attempt on Otterburn Tower, by the desire of Douglas entrenched themselves on a hill slope near, the exact site of which is somewhat uncertain, in order to give Percy an opportunity of coming to claim his pennon. The chivalrous Hotspur hastened after them with 600 horse and over 8000 foot, and came up while the Scots were at supper, whereupon a desperate hand-to-hand fight at once began. Douglas was greatly overmatched in numbers, and, seeing his men forced back, grasped his ponderous mace in both hands

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and hewed a way before him until he was borne down mortally wounded by three spear-thrusts. To some of his kinsmen anxiously asking how he did, Hume of Godscroft tells us the dying hero made answer, 'I do well, dying as my predecessors have done before; not in a bed of languishing sickness, but in the field. These things I require of you as my last petitions: first that ye keep my death close both from our own folk and from the enemy; then that ye suffer not my standard to be lost, or cast down; and last, that ye avenge my death, and bury me at Melrose with my father. If I could hope for these things, I should die with the greater contentment; for long since I heard a prophecy that a dead man should win a field, and I hope in God it shall be I.' Towards morning the Scots gained a complete victory, losing 300 men, while the English lost 1880, and among the prisoners both Hotspur and his brother Ralph. The Scottish ballad of 'Otterburn' is almost as historical as Froissart's glowing narrative; the English 'Ballad of Chevy Chase' is a glorious effort of the imagination, which still stirs a modern reader, as it did Sir Philip Sidney, more than the blast of a trumpet. See Robert White's monograph, *History of the Battle of Otterburn* (1857).

Ottery St Mary, a town of Devonshire, on the river Otter, 11 miles (15 by rail) E. of Exeter. Twice the scene of a great conflagration, in 1767 and 1866, it retains its magnificent collegiate church, a reduced copy of the cathedral of Exeter (q.v.), with the only other transeptal towers in England. Begun about 1260 by Bishop Bronescombe, it is Early English, Decorated, and Perpendicular in style, and was restored by Butterfield in 1849–50. The old King's Grammar-school was demolished in 1884. Alexander Barclay was a priest here; Coleridge (q.v.) was a native; and 'Clavering' in *Pendennis* is Ottery St Mary, the Devonshire residence of Thackeray's stepfather. Silk shoe-laces, handkerchiefs, and Honiton lace are manufactured. Pop. (1851) 2534; (1891) 3855.

Otto. See OTHO.

Otto, or **Attar, of Roses** is the volatile oil or otto of the petals of some species of rose, obtained by aqueous distillation, and highly prized as a perfume. It is a nearly colourless or light-yellow crystalline solid at temperatures below 80° F., liquefying a little above that temperature. It is imported from the East, where in the Balkan Peninsula, Syria, Persia, and India roses are cultivated to a considerable extent for its sake. It is probable that the oriental otto is the produce of more than one species of Rose (q.v.); it is uncertain what species is cultivated in some of the localities most celebrated for it, but *Rosa damascena* is known to be so employed in the north of India, and a kind of otto is sometimes obtained by the makers of rose-water from *Rosa centifolia* in Europe. Ghazipur, near Benares, is celebrated for its rose-gardens, which surround the town, and are in reality fields occupied by rows of low rose-bushes, extending over 160 acres. Cashmere is noted for its extensive manufacture of otto, as are also the neighbourhoods of Shiraz and Damascus. Kezanlik is the centre of the rose-growing district in the Balkans, which is 40 miles long; *Rosa moschata* affords the chief supply. The gathering is commenced on the third year, and is carried on chiefly in May and June. About 7200 lb. of petals are required to produce 2¼ lb. of otto, or about the gathering of 2½ acres. The pure essence fetches from £16 to £18 the pound, and the annual product in Roumelia may be £80,000 in good seasons. The French perfumers buy the first quality, Austria and America the second. In the south of France about 30 million pounds of roses are gathered annually for oil distillation at about 2s. 3d. per lb. According to some calculations, 250 to 300 lb. of rose-petals are required there to produce an ounce of otto by ordinary distillation. To procure the otto, the rose-petals are usually distilled with about twice their weight of water, and the produce exposed to the cool night-air in open vessels, from which the thin film of otto is skimmed with a feather in the morning. Otto is said to have been first procured by what may be called an accidental distillation of rose-petals exposed with water to the heat of the sun, and to have been found floating on the surface of the water; it is still sometimes obtained in India by such a process. It is said to be also obtained by dry distillation of rose-petals at a low temperature. During the distillation of rose-petals a small quantity of a solid volatile oil comes over, which crystallises and floats on the water in the receiver; this is sometimes called *English Oil of Roses*. Otto of roses is not unfrequently adulterated with geranium-oil, sandalwood-oil, oil of rhodium, &c. It is much used for making hair-oil, a drop of it being enough to impart a pleasant odour to a considerable quantity; olive-oil scented by a few drops of otto is often sold under the name of otto of roses. It is also used in making lavender-water and other perfumes. The odour of otto itself is too powerful to be altogether pleasant, and frequently gives headache. Another method of obtaining the *scent* of roses is described in the article PERFUMERY. Otto of roses is a mixture of two volatile or essential oils; the one solid at ordinary temperatures, and the other liquid. The solid oil of roses (rose camphor, stéaroptèn of oil of roses) possesses of itself very little odour. The liquid oil of roses (eléoptène of oil of roses) is a very fragrant liquid. The otto of roses may be regarded as a solution of one part of the solid oil in two parts of the liquid. Medicines are occasionally perfumed by otto of roses, and it is sometimes added to unguents and spirit-washes.

Ottoman Empire. See TURKEY.

Ottrelite, a silicate of alumina with protoxides of iron and manganese and water. It occurs in the form of thin hexagonal plates or tables in certain more or less metamorphosed slates, which are hence termed *Ottrelite-slate*.

Ottum'wa, capital of Wapello county, Iowa, on both sides of the Des Moines River, 75 miles by rail W. by N. of Burlington, in the heart of the state's bituminous coalfields. The residence portion extends along the high bluffs. A number of railways meet here; the general passenger depôt cost $125,000. Extensive dams concentrate the river's water-power; and the numerous industrial works include planing, flour, starch, and linseed-oil mills, foundries, plough, cutlery, and screen factories, bridge-works, cooperages, manufactories of furniture, boilers, &c., and a large pork-packing establishment. There is a normal school here. Pop. (1885) 10,506; (1890) 14,001.

Otway, THOMAS, one of the greatest masters of English tragedy, of whose life, says Dr Johnson, 'little is known, nor is there any part of that little which his biographer can take pleasure in relating.' He was born at Trotton in Sussex, March 3, 1651, son of the rector of Woolbeding in that county, and entered Christ Church, Oxford, as a gentleman-commoner in 1669. He was a brilliant and impulsive youth—'charming his face was, charming was his verse,' says Dryden, but his life throughout was darkened by the shadow of misfortune. He made a wretched failure as an actor in Aphra Behn's *Forc'd Marriage* in 1671, declined the church, and left the university without a degree in 1674, and next year obtained a cornetcy in a troop of horse. A year later he was settled in London, and

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had a tame and conventional tragedy, *Alcibiades*, accepted at the Duke's Theatre, which was managed first by Davenant, then by Betterton. In it the beautiful Mrs Barry made her first appearance, and with her the hapless poet quickly fell in love. In 1676 Betterton accepted *Don Carlos*, a good tragedy in rhyme, nervous and full of pathos, dedicated to the Duke of York. Its plot, like that of his greatest play, he owed to the Abbé St-Réal. The year after Otway translated Racine's *Titus and Berenice*, as well as Molière's *Cheats of Scapin*. The intrigue between Rochester and Mrs Barry now became more than he could bear, and through the influence of the Earl of Plymouth, a college friend, and one of the king's bastards, he received a cornet's commission again, and went a-soldiering to Flanders. It proved a complete fiasco, and he soon came back to his infatuation, miserable and unpaid, a butt for Rochester in his poor and spiteful *Session of the Poets*. In 1678 he had produced a poor comedy, *Friendship in Fashion;* in 1679 another, *The Soldier's Fortune*, full of touches of autobiographic detail. He was ever improvident and dissipated, and his affairs by this time had become desperate, but the death of his rival in 1680 seems to have nerved him to make a brave effort to shake off his burden of debt. That year yielded two tragedies, and his one important poem, *The Poet's Complaint of his Muse*, a rough, but firmly drawn satirical portrait of himself and his principal enemies, Rochester, Shadwell, and Settle. Of the plays, the first was *The Orphan*, a tragedy in blank verse, marred by many faults in plot besides its radical indelicacy, but stamped throughout with power and sovereign pathos, over whose central figure, Monimia, says Mr Gosse, perhaps more tears have been shed than over any other stage-heroine. The other was *The History and Fall of Caius Marius*, confessedly a kind of cento from Shakespeare's *Romeo and Juliet*, with touches from *Julius Cæsar*. The year 1682 saw his greatest work, *Venice Preserved, or a Plot Discovered*, a noble masterpiece of tragic passion, admirably constructed, its heroine Belvidera a delightful creation of almost the highest order of dramatic genius. The only blot upon its perfection is the comic passages, which M. Taine alone among critics finds Shakespearian. Otway's mistress was now at the height of her fame, and in the parts of Monimia and Belvidera had taken the town by storm. Six letters of his to her are extant, written apparently about 1682, which tell us the touching story of his faith and of her cruelty, how she played with his passion for seven years, and at last broke his heart. From this time he sinks out of sight, drowned in dissipation, debt, and misery. He reappears again in 1684 with *The Atheist*, a feeble comedy, and, on the death of Charles II. in February 1685, with *Windsor Castle*, a poem addressed to the new king. But his claims were neglected, and he wore out the ruins of his wasted life in abject misery in a spunging-house or tavern on Tower Hill. Here he died, April 14, 1685, choked, it is said, after a long fast, with a piece of bread, which he had rushed in the eagerness of hunger to buy with a guinea given him by a passing stranger from whom he had begged a shilling.

In 1719 a badly edited tragedy, *Heroick Friendship*, was published as his, and Mr Gosse thinks that, imperfect as the execution is, the plot and ideas are characteristic of Otway. The best edition of his works is still that by Thornton (3 vols. 1813). Otway owed much to Corneille, and was long popular in France, despite the severe and unjust judgment of Voltaire. His life recalls the tragic history of Marlowe, just as his greatest play reminds a reader of *Othello*. Strong without bombast, its exquisite love-scenes between Jaffier and Belvidera tender without weakness, 'it is simply,' says Mr Gosse, 'the greatest tragic drama between Shakespeare and Shelley. Out of the dead waste of the Restoration, with all its bustling talent and vain show, this one solitary work of supreme genius arose unexpected and unimitated.'

See Johnson's *Lives*, Ward's *History of English Dramatic Literature* (vol. ii. 1875), Edmund Gosse's excellent essay in *Seventeenth Century Studies* (1883), and the Hon. Roden Noel's edition in 'Mermaid' series (1888).

Ouabain is a crystalline glucoside separated from the wood and roots of *Carissa shimperi*, a plant growing on the east coast of Africa. It is intensely poisonous, a twelfth of a grain being sufficient to kill a rabbit. It acts upon the heart in the same way that digitalis does, and has been employed in medicine as a substitute for digitalis, and also to lessen the violence of the paroxysms in hooping-cough. The Somalis make an extract of the wood and roots for an arrow-poison.

Oubliette (Fr., 'place of forgetfulness'), a dungeon in which persons condemned to perpetual imprisonment were confined—especially a perfectly dark underground dungeon—into which the prisoners were let down from above by ropes.

Oudenarde (*Audenarde*), a town of Belgium, on the Scheldt, 37 miles W. of Brussels. It has a fine flamboyant Gothic town-hall (1535) and two interesting churches. Margaret of Parma was born here. Pop. 5864. In 1706 Oudenarde was taken by Marlborough; and an attempt made by the French to retake it brought on the famous battle of Oudenarde, the third of Marlborough's four great victories, which was gained, on the 11th July 1708, with the aid of Prince Eugene, over a French army under the Duke of Burgundy and Marshal Villars.

Oudh, or AWADH, a province of British India, separated on the north from Nepal by the lower ranges of the Himalaya, whence it gradually slopes, a great plain watered by the Gumti, Gogra, and Rapti rivers, to the Ganges. Area, 24,246 sq. m. Formerly an independent chief-commissionership, it is now administered by the lieutenant-governor of the North-west Provinces (q.v.). Pop. (1869) 11,220,232; (1881) 11,387,741; (1891) 12,652,730. The bulk of the inhabitants are Hindus, though the dominant native race for centuries has been Mohammedan. The Brahmans are the most numerous class, about one-eighth of the whole population. The principal towns are Lucknow (the capital), Faizabad, Bahraich, Shahabad, Rai Bareli, Ajodhya. Oudh is believed to have been one of the oldest seats of Aryan civilisation in India. After being the centre of a long native Hindu dynasty it was subjugated by the ruler of Kanauj, and in 1194 was made subject to the Mussulman empire of Delhi. In 1732–43 it became virtually an independent state, and the dynasty of the Nawabs lasted until the annexation of the province by the British in 1856. During the mutiny of 1857 Oudh was one of the centres of rebellion and the scene of highly dramatic events.—The city of Oudh or AJODHYA has been treated of under the second title.

Oudinot, CHARLES NICOLAS, Duke of Reggio and Marshal of France, was born at Bar-le-Duc, Meuse, 25th April 1767. At the age of seventeen he entered the army, and in the revolutionary wars distinguished himself in various actions with the Prussians and Austrians. In 1805 he obtained the Grand Cross of the Legion of Honour, and about the same time received the command of ten battalions of the reserve, afterwards famous as the 'grenadiers Oudinot.' At the head of this corps he did good service in the Austrian campaign. He was present at Austerlitz and Jena, gained the

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battle of Ostrolenka (16th February 1807), and greatly contributed to the success of the French at Friedland. He sustained his now brilliant reputation in the second Austrian campaign of 1809, and was created Marshal of France and Duke of Reggio. In 1810 he was charged with the occupation of Holland, was engaged in the disastrous Russian campaign, and subsequently took part in the various battles of 1813 between the French and the Russians and Austrians. He was one of the last to abandon Napoleon, but he did so for ever, and spent the period known as the 'Hundred Days' on his own estates. At the second restoration he became a minister of state, commander-in-chief of the royal guard and of the national guard, and was created a peer of France, Grand Cross of St Louis, &c. In 1823 he commanded the first division of the army of Spain, and was for some time governor of Madrid. After the revolution of July 1830 Oudinot retired to his estates; but Louis-Philippe in 1842 appointed him governor of the Invalides. He died at Paris, 13th September 1847. See his Life by Nollet (Paris, 1850).—His son, CHARLES NICOLAS-VICTOR OUDINOT, Duke of Reggio (1791–1863), was a general in the French army. He first distinguished himself in Algeria, and was general of the French expedition against Rome in 1849.

Ouida, the pseudonym of the novelist LOUISE DE LA RAMÉE, who was born about 1840, and spent part of her girlhood with her mother at Bury St Edmunds. About 1874 she was living in London at the Langham, and since then Florence has been her chief abode. She was writing for *Colburn's New Monthly* and *Bentley's Magazine* as early as 1861; and among more than a score of novels by her may be mentioned *Strathmore* (1865), *Idalia* (1867), *Under Two Flags* (the best, 1868), *Puck* (1869), *Folle Farine* (1871), *Pascarel* (1873), *Ariadne* (1877), *Moths* (1880), *Princess Napraxine* (1884), and *Guilderoy* (1889). Muscular heathenry, nature-worship, and an encyclopædic ignorance are the prevailing notes of these books, which remind one of scene-painting, very clever, but wholly unreal. There is a dash and go about them, a 'glamour' and glitter, and withal a singular sameness. One wearies of their brown harlots and blasé aristocrats; one ceases even to be amused with their classical and cosmopolitan malapropisms.

Ouistiti. See MARMOSET.

Oulachan. See CANDLE-FISH.

Ouless, WALTER WILLIAM, portrait-painter, was born 21st September 1848, at St Helier's, Jersey, and educated at Victoria College, Jersey. He began to study art in London in 1864; four years later first exhibited at the Academy; and became an A.R.A. 1877, an R.A. in 1881. Of his portraits perhaps that of Darwin is most generally known on account of the very fine etching from it by Rajon. Mr Ouless never paints a commonplace portrait, his work is sober and manly, and he is too great a student of character to make his art the medium of flattery. His portraits of Justice Manisty and Cardinal Newman are fine examples of his different methods.

Ounce (Lat. *uncia*), the twelfth part of the *as* or *libra* (pound), or indeed the twelfth part of any magnitude, whether of length, surface, or capacity. Hence *inch*, the twelfth part of a foot. In Troy weight the ounce is divided into 480 grains, and 12 ounces make a pound; the ounce in Avoirdupois weight contains 437½ grains Troy, and 16 of them go to the pound.

Ounce (*Felis uncia*), a feline carnivore like the leopard, but with lighter, longer fur, and with a skull unusually broad for one of the Felidæ. It frequents the mountains of central Asia. It may also be noted that a somewhat similar title, *Felis onca*, belongs to the jaguar.

Oundle, a small but ancient and pleasant town of Northamptonshire, 13 miles SW. of Peterborough by rail, has an old church, partly Early English and partly Decorated style, restored in 1864. Here St Wilfrid died. Laxton's Grammar-school dates from 1550. Lace is made here. Pop. 2890.

Ourari. See CURARI.

Ouro Preto ('Black Gold'), capital of the province of Minas Geraes, Brazil, stands among barren mountains, 3780 feet above sea-level, and 200 miles N. by W. of Rio Janeiro. It contains several handsome official buildings, but otherwise consists mainly of narrow and irregular streets. The gold-mining is now reduced to comparatively unprofitable washings. Pop. (1890) 22,000.

Ouse, a river of Yorkshire, formed by the union of the Swale and the Ure in the immediate vicinity of the village of Boroughbridge, and flowing south-eastward past York, Selby, and Goole. About 8 miles below the last town it joins the Trent, and forms the estuary of the Humber (q.v.). The length of its course from Boroughbridge is 60 miles, for the last 45 of which (from York) it is navigable for large vessels. Its principal affluents are the Wharfe and the Aire from the west, and the Derwent from the north-east. The basin of the Ouse, or the Vale of York, commences about the northern boundary of the county near the river Tees, from whose basin it is separated by a low ridge of hills, and extends southward, including almost the whole of Yorkshire (q.v.).—The GREAT OUSE, rising close to Brackley, in the south of Northamptonshire, flows north-eastward through the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk, till it falls into the Wash, 2½ miles below Lynn. It is 160 miles in entire length, and is navigable for about 50 miles. It receives the Ivel, Cam, Lark, and Little Ouse.

Ouseley, SIR FREDERICK ARTHUR GORE, musician, was born on 12th August 1825, and at nineteen succeeded his father, Sir Gore Ouseley (1770–1844), the celebrated Orientalist and first baronet. He graduated at Christ Church, Oxford, and took orders, his first curacy being at St Paul's, Knightsbridge. In 1855 he followed Henry Bishop as professor of Music at Oxford, and in 1856 became vicar of St Michael's, Tenbury. He had an immense knowledge of music, extending from St Ambrose to Wagner. His mastery of the literature of music is seen in his edition of Neumann's *History of Music*, and his treatises on harmony published in the 'Clarendon Press' series have taken their place as standard works. He was an accomplished linguist, and collected a magnificent library. His oratorios *St Polycarp* and *Hagar* are too solid and severe to be popular, but will always command respect. Havergal's *Memorials of F. A. G. Ouseley*, published after his death in 1889, is a collection of contemporary opinions pronouncing him a perfect gentleman, a skilled musician, and a churchman who devoted the whole of his fortune to building and endowing St Michael's College, Tenbury, for the training and education of choristers.

Outcrop, in Geology, the name given to the edges of strata as they appear or crop out at the surface. The same term is applied to the line along which a mineral vein or lode comes to the surface—although other terms, such as 'outgoing,' 'back,' are also employed by miners.

Outlawry, in English law, means putting one out of the protection of the law, for contempt

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in wilfully avoiding execution of legal process. Formerly, in the common law courts, if the defender would not enter an appearance certain proceedings were taken to outlaw him, so as to allow the action to go on without his appearance. These proceedings, however, were abolished in 1879, and, in the majority of cases, it is immaterial as regards the action whether the defendant appear or not, provided he was properly served with the original writ of summons. After judgment a defendant against whom a *capias* was granted might be outlawed if the sheriff failed to find him. These forms of process are now obsolete. In criminal proceedings it is still possible to outlaw a person who cannot be found and arrested. But a criminal who flies the country may now, as a general rule, be made amenable to justice by applying to a foreign government for his Extradition (q.v.). Outlawry therefore is practically obsolete. See Stephen's *Criminal Procedure*. The effect of outlawry was that a man forfeited his rights, and was precluded from suing or defending in any English court; but the outlawry might be reversed by means of a plea or of proceedings in Error (q.v.).

Outram, Sir James, the 'Bayard of India,' was born 29th January 1803, at Butterley Hall, Derbyshire, the residence of his father, Benjamin Outram (1764–1805), a well-known engineer. His mother in 1810 removed with her five children to Aberdeen, where and at Udny James was educated. After one session at Marischal College, in 1819 he received an Indian cadetship, and became lieutenant and adjutant in the Bombay native infantry. Between 1825 and 1835 (in which latter year he married his cousin, Margaret Anderson) he successfully organised a corps of the wild Bhils; from 1835 to 1838 he was political agent to the Mahi Kantha district in Gujrat. In 1839 he attended Sir John Keane as aide-de-camp into Afghanistan (q.v.); and his eight days' ride of 355 miles, disguised as an Afghan merchant, from Kelat, through the perilous Bolan Pass, to the sea, will long be famous in eastern annals. Appointed in 1840 political agent in Sind, he distinguished himself by his heroic defence of the British Residency at Hyderabad against 8000 Beluchis (15th February 1843), as also by his manly opposition to what he deemed Sir Charles Napier's aggressive policy towards the Ameer. He was afterwards resident at Satara and Baroda, and in 1854, on the eve of the annexation of Oudh, was selected by Lord Dalhousie for the highest political office in India—the Residency of Lucknow. In 1857, after a third brief furlough to Europe, he commanded the Persian expedition—a short, brilliant campaign, whose objects triumphantly attained, he returned to India a G.C.B. (he had been knighted sixteen months before). When he landed in July the Mutiny was raging; and Lord Canning tendered him the command of the forces advancing to the relief of Lucknow. He chivalrously waived that glory in favour of his old lieutenant, Havelock (q.v.), who already had fought eight victorious battles with the rebels; and accompanied him only as chief-commissioner of Oudh, whilst tendering his military services as a volunteer. Lucknow (q.v.) was relieved, and Outram took the command, but only to be in turn himself besieged. He held the Alum-bagh against almost overwhelming odds, until Sir Colin Campbell advanced to his relief. He then made a skilful movement up the left bank of the Gumti, which led to a final and complete victory. For his services he was in 1858 promoted to the rank of lieutenant-general, thanked by parliament, and created a baronet. He took his seat as a member of the Supreme Council at Calcutta, but in 1860 had to return to England, already stricken by the hand of death. He spent the winter of 1861–62 in Egypt, and, after a short stay in the south of France, expired at Paris, 11th March 1863. He was buried in Westminster Abbey; and statues of him have been reared in London and Calcutta. See his Life by Major-general Sir F. J. Goldsmid (2 vols. 1880).

Outrigger. See Boat.

Ouvirandra. See Lattice Leaf, Aquatic Plants.

Ouzel, or Ousel (Old Fr. *oisel*, 'bird'), an old name of the blackbird (as in *Midsummer Night's Dream*). But it is also applied to other birds. Thus, one British thrush (*Turdus torquatus*) is called the Ring Ouzel, and the Dipper (q.v.) is very generally known as the Water Ouzel.

Ovampos, or Ovambo, also called Otjiherero, an industrious and peaceable Bantu people of the west coast of Africa, inhabiting the country south of the Cunene. Ovampoland is accordingly in the German protectorate, and extends from Damaraland northward to the Portuguese frontier. Some 50 miles from the coast the country rises into a lofty tableland, which is moderately fertile, and then declines to the south and east into the deserts of the Kalihari and the region of Lake Ngami. Many strong indications of copper ore are found in various places. Ivory is still traded in.

Ovariotomy, in Surgery, the excision of the ovaries. The ovaries in the female are analogous to the testes in the male, and are two oblong flattened bodies (about an inch and a half in length, three-quarters of an inch in width, and nearly half an inch thick in the human subject), situated on either side of the uterus, to which they are connected by ligaments and by the Fallopian tube. The ovary is composed of two well-defined portions, a superficial or 'cortical' portion, and a deep or 'medullary' portion. The whole is enclosed in a tough fibrous coating, which is, however, closely blended with the cortical portion, and cannot be stripped off. It is termed the *tunica albuginea*. The medullary portion is highly vascular, and of a reddish colour. The cortical portion in the adult ovary contains an enormous number of vesicles, varying greatly in size. These are the *Graafian follicles*, and contain the ova or germs—the female element of reproduction. Their number is estimated at 30,000. From ten to twenty large and more or less mature vesicles are found near the surface, to which they gradually approach as they become developed. The structure of these ovisacs and their contained ova is somewhat complex, and cannot be described here. More or less coincident with menstruation is the process of *ovulation*, by which is meant the rupture of the wall of Graafian follicle, and the escape of the contained ovum. On its escape from the ovary the ovum enters the end of the Fallopian tube, by which it is conveyed into the uterus.

The ovary is the subject of several diseased conditions. (1) It is the seat of acute and chronic inflammation. This may arise from injuries during labour, operations in the pelvis, but very frequently is the result of gonorrhœal infection, spreading from the vagina. Such inflammations cause great organic changes in the structure, often leading to sterility, and they are usually associated with severe pain, frequently so intense as to unfit the subject for all active duty. (2) The ovary is the seat of new growths, which may be of several varieties. Some represent enlargements of one or more Graafian follicles, and attain an enormous size, sometimes weighing 100 lb. or more. They contain fluid which is usually of a viscid, ropy nature, and brownish colour, but sometimes presents other characters. These are known as *ovarian cysts*. Other tumours are of a more or less solid nature, and contain portions of hair, teeth, bone, &c., and

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are known as *dermoid tumours*. Moreover, the ovaries may become the seat of cancerous disease with or without the occurrence of such tumours.

The treatment of ovarian disease by the removal of the offending organ is one of the triumphs of modern surgery. Formerly relief in cystomata was only obtained temporarily by tapping—i.e. withdrawing some of the fluid by means of a trocar and canula. But the tumour almost always filled again, and, though tapping might be repeated time after time, the patient ultimately succumbed. Now the abdominal wall is laid open, the tumour emptied as much as possible of its contents, the collapsed sac drawn through the incision, its neck secured by ligature or otherwise, the mass cut away, the stump returned to the abdomen, and the wound carefully closed by stitches.

Towards the middle of the 19th century the operation was performed by a few surgeons, under the protest of the great majority of the medical profession; now it takes its place as a routine operation, demanded in any suitable case, and performed with results as regards the saving of life and restoration to health, together with an immunity from risk, which can be claimed by no other major operation. The operation for extirpation of ovarian cystoma was first performed by Ephraim M'Dowell of Kentucky in 1809, but was established in England as a regular operation by Charles Clay of Manchester, who operated on his first case in 1842. Clay operated on nearly 400 cases with 69 per cent. of recoveries. Since then the operation has been performed many thousands of times, and the mortality has been reduced to a figure which renders the operation, while always one of the gravest, yet, in competent hands, one of the safest in surgery. To this result the labours in Britain of Spencer Wells, Thomas Keith, and Lawson Tait have mainly contributed. With the best operators the mortality at this moment is probably less than 5 per cent., and some have had series of over 100 cases without a death. This result has been ascribed to various causes, such as the mode of treating the pedicle, or stump, the use of antiseptics, &c., but is probably most due to the experience acquired in dealing with the various complications and difficulties arising in the operation.

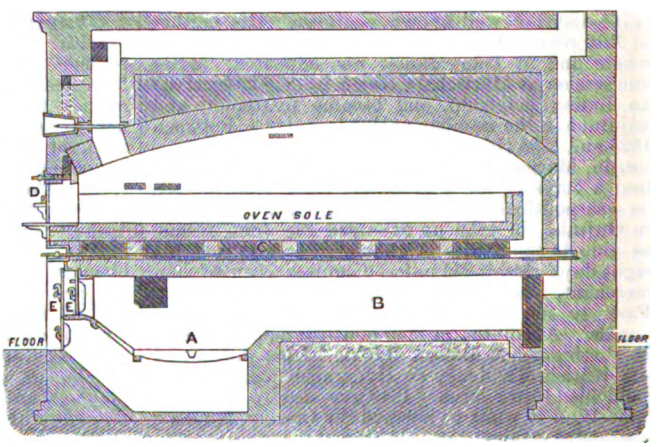
Within the last few years the removal of the ovaries and Fallopian tubes for other than cystic disease has come to be recognised as a regular operation, and is now frequently performed. The conditions which are considered as demanding this are: (1) Chronic inflammation in the ovaries or tubes, resulting in the formation of pus, &c. in the latter, or giving rise to intolerable pain and discomfort, and rendering life utterly miserable; (2) cases of fibroid tumour of the uterus, in which life is threatened by the great loss of blood which these tumours often cause. Removal of the ovaries in these cases when possible is usually followed by cessation of growth and shrinking of the tumour, and entire stoppage of serious hemorrhage.

Consult *Diagnosis and Treatment of Abdominal Tumours*, by Sir Spencer Wells (1885), and *Diseases of Women*, by Lawson Tait (1885).

Ovary, in Botany, the part of the Pistil (q.v.) containing the Ovule (q.v.). See FLOWER, FRUIT, SEED.

Ovation. See TRIUMPH.

Oven. The old type of baker's oven, still very largely used, is a low arched chamber either of brick with a tile or stone sole, or built entirely of stone. A common size of sole is 11 feet 6 inches by 9 feet 6 inches (some are smaller), with sides 18 inches high, from which the crown or arch springs. The door is in front, and the dough is put in with a long wooden spade called a 'peel.' In one class of these ovens the fireplace or furnace is placed in the front corner, with an opening admitting the products of combustion directly into the oven, while there is an exit flue on the other side. This furnace is fired from the bakehouse; coke or coal is used for fuel, and any smoke is mostly cleared away during the heating up of the oven. Sometimes the plan of having a fixed fire within the oven itself is adopted, and another way is to have a movable iron furnace, called a chaffer, which can be shifted from place to place, so as to evenly heat the oven. For this inside firing wood is the best fuel. In Scotland a peculiar sort of stone is used for the construction of oven soles. It is a kind of serpentine, is of a refractory nature, and is called 'lakestone' or 'leckstone.' This rock, termed by geologists picrite, is quarried at Blackburn, near Bathgate, and two or three other places in Scotland. It makes a better and more durable sole than tiles or bricks.



Bailey-Baker Oven—Longitudinal Section:
A, furnace bars; B, main flue; C, air chamber; D, door of oven; E, E, doors of furnace.

Many new forms of ovens have been introduced of late years. Among others the Bailey-Baker oven is being extensively adopted. It is shown in longitudinal section in the annexed figure. It can be used either as an externally or as an internally heated oven. The furnace is placed below the oven sole, and the heated gases which are generated pass, by means of flues, entirely round the oven without actually entering it, if it is to be worked solely by external heat. But by means of openings, regulated by valves or dampers, the gases from the furnace can be led into the oven, and so heat it internally. The construction of the oven is such that, even when worked in the latter way, fragments of fuel rarely get inside, so that comparatively little cleaning is necessary, and baking can go on continuously with the exception of the time required to fill and discharge the oven.

Some ovens are now heated with hermetically-sealed iron pipes containing water, which is converted by heat into superheated steam (see STEAM). The pipes are placed inside the oven, but a portion, or portions of them, project through its back wall into a furnace. Perkins was the originator of

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this method of heating. A recent form is known as the Weighorst steam-heated oven. It has a draw-plate, or movable sole, fixed on wheels, so that it can be drawn out in front of the oven and loaded or unloaded very quickly. With this oven there is little time required for raising the heat between the batches. Another way of heating ovens is by gas-burners. Ovens for army use in barracks or the field are generally arranged so as to be serviceable for cooking meat, roasting potatoes, coffee, &c., as well as baking bread. In those for the field portability is a main essential. For biscuit ovens, see BISCUITS. Coke-ovens are described under COKE.

Oven-bird, a genus (*Furnarius*) and sub-family (Furnariinæ) of Passerine birds, family Dendrocolaptidæ. The name is given because some of the species build nests resembling an oven or beehive. The genus, which consists of nine species, is exclusively South American, ranging from Guiana and Ecuador to La Plata. The habits of these birds have been described chiefly by Mr Edward Bartlett, and by Darwin in his *Voyage of the Beagle.* The name oven-bird is also applied, for a similar reason, to the willow-wren (*Phylloscopus trochilus*).

Overbeck, JOHANN FRIEDRICH, painter, was born at Lübeck, 4th July 1789, and commenced his art studies at Vienna in 1806 as a pupil of the pseudo-classical school of David; but, having adopted notions on art essentially different from those inculcated in the academy, he was expelled along with some like-minded friends, and in 1809 set out for Rome. His principle was to abjure the classical Renaissance and its sensuousness, and to 'abide by the Bible.' In Rome he was joined by Cornelius, Schadow, Schnorr, and Veit; and these five laid the foundation of a school that influenced the taste for art in Europe, though they were scoffed at as 'Pre-Raphaelites,' 'Nazarites,' 'Church-Romantic painters,' and had long to struggle with poverty. A picture of the Madonna, which Overbeck painted in 1811, brought him into marked notice. He was next employed by the Prussian consul, Bartholdy, to execute for his house at Rome frescoes illustrating the history of Joseph, the 'Selling of Joseph' and the 'Seven Lean Years' being the subjects assigned to Overbeck. After completing these he painted in fresco, in the villa of the Marchese Massimo, five large compositions from Tasso's *Jerusalem Delivered.* In 1813 he abjured Lutheranism, and embraced the Roman Catholic religion. Overbeck's chief work is a fresco at Assisi, 'The Vision of St Francis.' His oil-pictures are inferior to his frescoes, being dry and weak in colour. Among his famous pictures are 'Christ's Entry into Jerusalem,' at Lübeck; 'Christ's Agony in the Garden,' at Hamburg; 'Lo Sposalizio,' at Berlin; 'The Triumph of Religion in the Arts,' at Frankfort; the 'Incredulity of St Thomas,' in London. He executed a great many drawings and cartoons remarkable for devotional feeling, most of which, like his frescoes and paintings, have been engraved. One of his last undertakings was a series of designs from the Evangelists, delicately engraved in the line manner. Amongst the characteristics of the school are devout feeling, hardness of outline, scholastic composition, and the avoidance of merely sensuous beauty both in colour and form. Overbeck died at Rome on 12th November 1869. See Life by J. B. Atkinson (1882), in 'Great Artists' series.

Overbury, SIR THOMAS, was born in 1581 at Compton-Scorpion, in Ilmington parish, Warwickshire, his father being squire of Bourton-on-the-Hill in Gloucestershire. After three years at Queen's College, Oxford (1595–98), he studied awhile at the Middle Temple, and travelled then on the Continent, returning an accomplished gentleman. In 1601 at Edinburgh he met Robert Carr, then page to the Earl of Dunbar, and the minion afterwards of James I., who knighted him in 1607, and in 1611 made him Viscount Rochester. The two became inseparable friends, and Overbury himself was, through Carr's influence, knighted in 1608, the year before his second visit to France and the Netherlands. Meanwhile, in 1606, the lovely but profligate Frances Howard (1592–1632) had married the third Earl of Essex (q.v.), and during his two years' absence had intrigued with more than one lover—Carr the most favoured. Overbury had played pander to their guilty intercourse; but Carr now telling him that he purposed to get Lady Essex divorced from her husband, and then to marry her, he strongly deprecated the idea, declaring she might do for a mistress but not for a wife. Carr informed Lady Essex what Overbury had said of her; she became furious for revenge, and offered Sir David Wood (between whom and Sir Thomas there was a standing feud) £1000 to assassinate him—an offer prudently declined, except under royal assurance of pardon. So on 21st April 1613 Overbury, on a most trivial and illegal pretext—his contemptuous refusal to go on an embassy—was thrown into the Tower, where on 15th September he was poisoned. Three months later Carr (just created Earl of Somerset) and his paramour were married with great pomp, and the whole affair was soon to appearance forgotten. But in the autumn of 1615, after Villiers had largely supplanted Somerset, an enquiry was instituted, and four of the humbler instruments were promptly hanged—among these Mistress Anne Turner in her starched yellow ruff. In May 1616 the countess pleaded guilty, and the earl was found guilty; but by an amazing stretch of the royal prerogative they were pardoned. In 1622 they were even released from the Tower; and Somerset survived till 1645.

Overbury's works, all published posthumously, include *The Wife* (1614), a didactic poem; *Characters* (1614), whose conceits are not lacking in epigrammatic point; and *Crumms fal'n from King James's Table* (1715). They were collected in 1856 by E. F. Rimbault, with a Life prefixed. See also Andrew Amos, *The Great Oyer of Poisoning* (1846); Gardiner's *History of England;* Spedding's *Studies in English History* (1886); and other works cited at JAMES I., BACON, and COKE.

Over Darwen. See DARWEN.

Overland Route to India, Australia, and the East is now understood to be that from England across France, through Mont Cenis by tunnel, to Brindisi in Italy, thence through the Levant, the Suez Canal, Red Sea, and Indian Ocean. This makes the journey only about half as long as the voyage round by the Cape of Good Hope, a little over 6000 miles instead of more than 12,000. The saving in time is even more considerable. The time from London to Bombay is about four weeks, instead of three months by the Cape. In 1838 a monthly service was started to carry the mails across Egypt; but to Lieutenant Waghorn (1800–50) belongs the credit of first showing how the voyage from India could be still further shortened. On 31st October 1845 he arrived in London with the Bombay mail of the 1st October (*vid* Austria, Bavaria, Prussia, and Belgium). The railway from Suez to Alexandria by Cairo was opened in 1858; but the great event that rendered the Overland Route available for passengers generally was the opening of the Suez Canal in 1869. See also EUPHRATES.

Overlap, in Geology. When the upper beds of a conformable series of strata extend beyond the

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bottom-beds of the same series, the former are said to overlap the latter. Hence strata showing this structure constitute an *overlap*.

Overstone, SAMUEL JONES LOYD, BARON, an economist and financier, was born in London, 25th September 1796, being the only son of Mr Lewis Loyd, descended from a respectable Welsh family, and a leading partner in an eminent banking-house. From Eton he passed to Trinity College, Cambridge. On leaving Cambridge Loyd entered his father's banking-house, afterwards merged in the London and Westminster Bank. He entered parliament in 1819 as Whig member for Hythe, which he continued to represent till 1826, and in 1850 was raised to the peerage by the title of Baron Overstone and Fotheringhay. The first of Lord Overstone's famous tracts on the management of the Bank of England and the state of the currency was published in 1837, and was followed by others between that period and 1857. The proposal for making a complete separation between the banking and issue departments of the Bank of England, introduced by Peel into the Act of 1844, was first brought forward in these tracts. Lord Overstone was currently believed to have been worth £6,000,000 or £8,000,000, but after his death, without male issue living, on 17th November 1883, his personal estate was sworn under £2,118,803. He zealously opposed the principle of limited liability, and the introduction of the decimal system.

Overseers. See PARISH, POOR-LAWS.

Overton, a parliamentary borough of Flintshire (detached), near the Dee, 23 miles NNW. of Shrewsbury. With Flint, &c., it returns one member. Pop. 1131.

Overture (Fr. *ouverture*) was originally an instrumental prelude to an opera, oratorio, &c. It first received definite form from the composer Lully (q.v.), whose pattern was followed by most succeeding writers, including Handel, up to the time of Gluck and Mozart. The somewhat different Italian form, styled *Sinfonia*, was developed by Scarlatti. Modern overtures almost defy classification. Two leading styles may be indicated—the *medley* form, in which various melodies from the succeeding opera are interwoven, and the finest examples of which are by Weber and Wagner; and the independent concert overture, usually in the form of a first movement of a sonata, without repeat, of which Mendelssohn's are the type. Mozart's *Magic Flute* overture is a triumph of constructive skill, combining the forms of sonata and fugue. Beethoven's *Leonora No. 3* is considered the greatest of all; while foreshadowing the events and music of the opera, it has an individual form of its own, as has also his *Egmont* overture. Operas—e.g. Wagner's—now usually commence with a short *Introduction* or *Prelude*, leading without break into the first scene.

Overyssel, a province of the Netherlands, lying on the east side of the Zuider Zee, and separated from Guelderland on the south by the river Yssel. Area, 1291 sq. m.; pop. (1887) 291,462. Rich meadows cover almost one-third; moors are extensive; the province is well intersected by canals. The chief cities are Zwolle, Deventer, and Kampen.

Ovid (PUBLIUS OVIDIUS NASO), born March 20, 43 B.C., at Sulmo, the present Solmona, in the Abruzzi, was the younger of two sons, both of whom were brought early to Rome by their father, a well-to-do *eques*, who placed them under the most famous rhetoricians of the day, to be trained for the bar. His brother Lucius died in his twentieth year, and Publius, in spite of extraordinary forensic aptitude, gave up his whole time and energies to poetry. He filled, indeed, a few legal posts, but soon abandoned them, and, like other young Romans of his class, repaired to Athens, whence he crossed to Asia Minor, and on the return journey lingered a while in Sicily. While still a youth he married, but almost immediately separated from his wife, only to take another, with whom he lived scarcely more happily. By her he had a daughter, Perilla, herself a poetess. He married yet again, and this, his third wife, Fabia, gained and returned his best affections, and, unlike her two predecessors, survived him. His life at his country-seat, among congenial friends and in correspondence with the most distinguished of his contemporaries, was an enviable one. Messala Corvinus, a highly cultured poet, exercised on his rapidly developing powers a salutary influence, reinforced by that of the younger Macer, author of the *Ante-Homerica* and *Post-Homerica*, of Propertius, the epic poet Ponticus, and others. He had no acquaintance personally with Tibullus or Virgil, both of whom died 19 B.C.

His first literary success was his tragedy *Medea*, of which Quintilian had a high opinion. Then came his *Epistolæ* or *Heroides*, imaginary love-letters from ladies of the heroic foretime to their lords: but in his next publication he touched the sphere he has made peculiarly his own—his *Amores*, so called from their subject-matter. Here he had Gallus, Tibullus, and Propertius for exemplars, and in wit and wayward fancy, less often in soul and passion, he excelled them all. His *Medicamina Faciei* (a practical poem on artificial aids to personal beauty) seems to have been preliminary to his true master-work, the *Ars Amandi*, or *Ars Amatoria*, in three books, which appeared about 1 B.C., followed by a subsidiary book entitled *Remedia Amoris*—the former teaching how to win and preserve the love of woman, the latter how to relieve the rebuffs and disappointments encountered in the attempt. These publications close the first period of the poet's activity: the second opens with the *Metamorphoses*, in fifteen books, and with the *Fasti*, designed to be in twelve, of which six only were completed. The *Metamorphoses*, according to Bernhardy, surpasses all that antiquity has to show in brilliant and felicitous metrical narration. The *Fasti*, a contemporary work, forms in elegiac distiches a poetic commentary on the calendar, wherein the origin of Roman feast-days, divinities, and religious observances is set forth. Midway in its composition he was banished (8 A.D.); but shortly before he died he worked at a revised version of it in order to dedicate it, thus recast, to Germanicus—the original having been inscribed to Augustus. But he did not carry out this project. As it stands the *Fasti* seeks to ennoble the policy of Augustus, and, by revivifying their forgotten religious ceremonials, to re-awaken in the Roman people the sentiment out of which these ceremonials sprung.

Posterity has failed to fathom the true ground of Ovid's banishment—the poet himself refraining studiously from all but the vaguest allusions to it. He admits that he deserved to be so punished, but he also declares that he was more the witness than the author of the offence. Whether he was concerned in some intrigue of the licentious Julia, or in one of the many scandals connected with Agrippa Postumus, will never be cleared up. Nothing could move Augustus to a reprieve of the sentence; so in the late autumn, 9 A.D., he left Rome, as 'relegatus, non exul,' for Tomi, on the Euxine (close to the present Kustendji). There, at the outskirts of Roman civilisation, severed from wife, daughter, relatives, and friends, with only the nomadic Scythians for neighbours, he languished out the last years of his life. Tiberius remained as deaf to his appeals for mercy as Augustus, and there he died

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in 17 A.D. This period constitutes the third of his poetic activity—in which his genius, bereft of its gaiety, responds to his invocation only in the minor notes of melancholy. Already on his last journey from Rome he began the elegies which he published in five books, by name the *Tristia*. Similar in tone and theme are the four books of the *Epistolæ ex Ponto*, differing only in this from the *Tristia* that they are addressed to a particular friend in Rome—a step he did not venture on in the composition of the latter. His *Ibis*, written in imitation of Callimachus, in which he invokes destruction on an enemy unknown, and his *Halieutica*, a poem, extant only in fragments, on the fish of the Euxine, complete the list of his remains.

In mastery of metrical form and in creative fecundity Ovid outsoars all the poets of the Augustan cycle. From his youth up he was so favourably circumstanced that he passed quickly through the successive stages of his development till he reached the highest perfection of which he was capable. The struggle between the new poetry and the old had issued in the subjection of the latter, and he entered immediately on the inheritance prepared for him by others. This he carried to its culmination, in finish as in form. He stands at the limit of the Augustan without by a hair's breadth encroaching on the Silver age. The poetic circle in which he lived, the *beau monde* of Rome in which he moved, the favour of the court in which he basked, all contributed to mould his genius and stamp its products with the hall-mark of 'society.' In that world he has always been a favourite, contriving as he did to combine learning with lightness of touch, force with finish, variety with order. He knew the *vie intime* of the contemporary world, in its real as in its conventional forms, and he could sweep the collective chords of human passion, from love to hate, with the assured boldness of a master. He is the most voluminous of Latin poets, and in this characteristic may be found the cause of his chief defects—his self-repetition, his too frequent echoings of former felicities, the monotony of his cadences, particularly in the elegiac distich. In this metre, where the thought rarely overflows the two-line limit, he has developed a sententiousness in which Quintilian traces his forensic education.

There are old translations of the *Metamorphoses* by Golding (1565), and Garth (q.v.), and others; and an admirable one by King (1871). Complete editions of the text are by Merkel (1853) and Riese (1872–74); of the *Heroides*, by A. Palmer (1874), *Ibis*, by Robinson Ellis (1882), and *Tristia*, by S. G. Owen (1890). See the judgments of Bernhardy, Teuffel, and Ribbeck; also Zingerle's *Ovid und sein Verhältniss zu den Vorgängern* (3 vols. 1869–71), and Rev. A. Church's study in 'Ancient Classics for English Readers' (1876).

Oviedo, the capital of the Spanish province of Asturias (q.v.), 20 miles by rail SSW. of Gijon on the Bay of Biscay and 87 N. by W. of Leon. Standing in a plain between the rivers Nalon and Nora, and sheltered to the north by a hill 470 feet high, it has four main streets, branching off from a central square, and possesses a cathedral, a university (1604), a theatre, a botanic garden, a fine aqueduct, &c. The cruciform cathedral, dating from 781, but mainly rebuilt between 1388 and 1528, is a noble specimen of richly ornamented Gothic, with a tower 284 feet high, the remains of fourteen early kings and queens of Asturias, many much-prized relics, and a fine old library. In or near the city there are several ancient Romanesque churches. Linens, woollens, hats, and firearms are manufactured; whilst in the neighbourhood are many ironworks, and at Prutia (12 miles W.) a great government foundry, producing cannon, rifles, bayonets, &c. Pop. (1887) 42,716. Oviedo, the ancient *Asturum Lucus* or *Ovetum*, was known during the middle ages as *Civitas Episcoporum*, because many of the Spanish prelates, dispossessed of their sees by the Moors, took refuge here. It was twice plundered by the French of its ecclesiastical and other treasures, in 1809 and 1810.

Oviedo y Valdes, GONZALO FERNANDEZ DE, born at Madrid in 1478, was sent by Ferdinand to St Domingo, in the West Indies, in 1514, as inspector-general of the gold-mines, and subsequently was appointed historiographer of the Indies. After his return to Spain he published a history thereof (1526). Of a second edition (21 vols. 1535) an English translation was made by Eden in 1555; a complete edition of the entire work appeared at Madrid in 4 vols. 1851–55. Oviedo died at Valladolid in 1557. He likewise wrote *Las Quincuagenas*, a valuable gossiping account of the principal personages of Spain in his time.

Oviparous is an objectionable term applied to the great majority of female animals, whose eggs are first laid and then hatched. *Ovoviviparous* is a corresponding term applied to animals in which the eggs are hatched within the body of the mother, and where there is no nutritive connection between parent and offspring. Some reptiles, amphibians, fishes, &c. which do not lay their eggs illustrate this mode of parturition. In regard to the terms oviparous and ovoviviparous it should be noted (1) that all animals are in one sense viviparous, for whatever is born is normally alive; (2) that 'viviparous' animals *par excellence*—viz. the placental mammals—differ from 'ovoviviparous' animals, such as the brown lizard (*Zootoca vivipara*), the blindworm, the black salamander (*Salamandra atra*), one of the blennies (*Zoarces viviparus*), and many invertebrates which bring forth already hatched young, not so much in the manner of birth as in the relation between mother and offspring before birth; (3) that oviparous and viviparous parturition often occur in the same class—witness the oviparous Monotremes among mammals; (4) that oviparous and ovoviviparous parturition often occur in nearly related forms among reptiles, fishes, amphibians, and invertebrates—that they even occur in the same animal: e.g. the grass-snake (*Tropidonotus natrix*), which usually lays eggs, but may in artificial conditions bear already hatched young; or some aphides in which the parthenogenetic generations are usually born as young insects, while the fertilised eggs are laid as such. In short, the distinctions are for the most part differences of degree.

Ovoca. See AVOCA.

Ovule, a little egg; in Botany the rudimentary seed. It needs to be fertilised by the pollen tube before it can develop and grow into the seed. The ovule has a complicated structure which can only be properly understood by comparing it with the corresponding parts of the lower plants known as the Vascular Cryptogams. In the common Ferns (q.v.), when a spore is sown a small green plant, the prothallium, grows from it; this bears male and female organs called antheridia and archegonia. A male sperm from an antheridium fertilises the egg-cell of an archegonium, and a plant which we call the fern grows from it. In other plants called heterosporous ferns, because the differentiation into sexes has been carried further back in the life-history of the plant, and the spores are of two kinds, male and female, the female prothallium grows inside the spore-case, bursting it, but not leaving it. In Conifers the prothallium is still more reduced, is surrounded by a mass of tissue called the nucellus, and also by an 'integument.' In ordinary flowering plants the history of the ovule is as follows: On a special leaf called a carpel a mass of tissue grows called the nucellus; this

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becomes covered in by two integuments which grow up from its base, but leave an opening at the top called the micropyle. A cell near the top of the nucellus represents the mother-cell of the female spore of the vascular cryptogams. It divides into two and then into four; one of these becomes the female spore; it is called the embryo-sac because the embryo will be formed within it. The male spores of the vascular cryptogams are represented by the pollen grains contained in special leaves called stamens; a pollen grain being placed on a part of the ovary sends out a tube which enters the micropyle. The nucleus of the embryo-sac now divides into two, one daughter-nucleus travels to each end of the sac; it there divides into two, then into four, daughter-nuclei. One of these from each end travels back to the centre of the sac; they fuse and form the secondary nucleus of the sac. The three remaining nuclei at the end near the micropyle are supposed to represent three archegonia; the three at the other end are supposed to represent the rest of the prothallus. Only one of the three archegonia—the inner one, called the oosphere—will develop into the embryo if fertilised; the other two merely aid in that process. Fertilisation is effected by the pollen tube entering by the micropyle and touching one of the outer archegonia, which then breaks up and becomes attached to the oosphere; this is now called oospore, and grows into the embryo, while the secondary nucleus of the embryo-sac by repeated division gives rise to a tissue which fills up the embryo-sac, called endosperm, rich in food materials upon which the embryo feeds. The embryo-sac at the same time grows, displacing the tissue of the nucellus. This is a generalised description. There are variations in the different orders of flowering plants.

Owego, capital of Tioga county, New York, on the Susquehanna River (here bridged), at the mouth of Owego Creek, 228 miles by rail NW. of New York City. It manufactures pianos, flour, soap, leather, &c. Pop. 5525.

Owen, JOHN, epigrammatist, was born at Arnion, in Carnarvonshire, in 1560, and had his education at Winchester and New College, Oxford, where he became a Fellow in 1584. He was afterwards a schoolmaster at Warwick, died in 1622, and was buried in St Paul's Cathedral. He had a great reputation in his day as a writer of Latin verse, and as the 'British Martial' his fame as an epigrammatist was widely spread also on the Continent. His robust Protestantism sharpened into stinging wit placed his book on the Roman *Index* in 1654. Three books of the *Epigrammata* appeared in 1606; additions were made in later editions. The best edition is that by Renouard (Paris, 2 vols. 1795). An English translation was published as early as 1619. See EPIGRAMS.

Owen, JOHN, a great Puritan divine, was born at the vicarage of Stadham, in Oxfordshire, in 1616. At twelve he was admitted at Queen's College, Oxford, where he worked with amazing diligence, for years taking no more than four hours' sleep a night. In 1632 he took his B.A. degree, and M.A. in 1635, and two years after was driven from Oxford by dislike to Laud's new statutes. The next three or four years of his life were spent in a state of anxious and melancholy introspection, as chaplain first to Sir Robert Dormer of Ascot, next to Lord Lovelace of Hurley; but the outbreak of the war left him without a patron, and about the same time his zealous Puritanism cost him the estate a wealthy Welsh uncle meant to have bequeathed him. He now removed to London, where a casual sermon, preached by a stranger in Calamy's church, brought to his heart that peace he had long laboured after in vain. In 1642 he published *The Display of Arminianism*, a work for which the 'Committee for Purging the Church of Scandalous Ministers' rewarded him with the living of Fordham in Essex. Here he married a lady named Rooke, who bore him eleven children. In 1646 he removed to Coggeshall, and here made public his growing aversion to Presbyterianism, and preference for a moderate form of Independent church government. The Presbyterian ministers fell upon him at once for his apostasy, but all their acrimony, dogmatism, and intolerance failed to perturb his sober temper. At Coggeshall he wrote his *Salus Electorum, Sanguis Jesu*, the result of seven years' study, and of which he himself said that 'he did not believe he should live to see a solid answer given to it.' On April 29, 1646, he preached before parliament, and to his discourse, when printed under the title of *A Vision of Free Mercy*, he added an Appendix in which he pleads for liberty of conscience in matters of religion. He was again chosen to preach before the House of Commons the day after the execution of King Charles I. (January 31, 1649), but discreetly avoided a vindication of the act by making no reference to it whatever. About this time Cromwell made his acquaintance, and thought so highly both of his preaching and character that he carried him to Ireland as his chaplain. Here he remained about half a year, regulating the affairs of Trinity College. Next year (1650) he went with Cromwell to Scotland, and resided in Edinburgh for several months. In 1651 the House of Commons appointed him dean of Christ Church, Oxford, and in 1652 he was admitted vice-chancellor of the university. The manner in which he discharged his duties reflects the highest credit on his moderation and impartiality. Most of the vacant livings in his patronage were bestowed on Presbyterians; and Episcopalians were allowed to celebrate divine worship in their own way, nor could the vice-chancellor ever be induced to offer them the slightest molestation. While at Oxford the 'Atlas of Independency,' as Wood styles him, wrote his *Diatriba de Divina Justitia*, his *Doctrine of the Saints' Perseverance*, his *Vindiciæ Evangelicæ*—against Biddle and the Socinians—and his *Mortification of Sin in Believers*. He was one of the well-known Triers appointed to purge the church of scandalous ministers, and in this capacity signalised himself by his friendly offices on behalf of men of learning and merit like Dr Edward Pocock, Laud's professor of Arabic. Owen opposed the giving the crown to the Protector, and it appears that a coldness arose between the two. In 1657 he was succeeded as vice-chancellor of the university by Dr Conant, and the year after Cromwell's death he was ejected from his deanery. He retired to Stadham, in Oxfordshire, where he had purchased an estate, and here he formed a congregation, to which he ministered until his removal to London shortly after the Restoration. The writings belonging to this period of retirement are *Communion with God; On the Divine Original, Authority, Self-evidencing Light and Power of the Scriptures; Theologoumena, or De Natura, Ortu, Progressu, et Studio Veræ Theologiæ;* and an uncritical and irreflective diatribe against Walton's *Polyglott*. In 1662 he published, at Clarendon's request, *Animadversions to Fiat Lux*, a treatise written by a Franciscan friar in the interests of Roman Catholicism. It was followed by works on *Indwelling Sin*, on the 130th Psalm, and on the Epistle to the Hebrews, the last of which began to appear in 1668, and is usually reckoned Owen's greatest work. In 1669 he published *Truth and Innocence Vindicated*, a reply to Samuel (afterwards Bishop) Parker's *Discourse on Ecclesiastical Policy*, and in 1673 became

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pastor of a large congregation in Leadenhall Street. His last publications of importance were a *Discourse Concerning the Holy Spirit* (1674); *Doctrine of Justification by Faith* (1677), a treatise still much admired by many; and *Christologia, or Glorious Mystery of the Person of Christ.*

Already in 1663 he had declined a call to Boston in New England, as he did an invitation in 1670 to become president of Harvard. In his later years he was held in the highest esteem by many of the most influential personages in the land, and he had repeatedly long conversations with both Charles II. and the Duke of York on the subject of Nonconformity. In his controversies with Sherlock and Stillingfleet he came off triumphant, and to the end of life he preached and wrote incessantly, notwithstanding the torments of the stone and asthma. He died at Ealing, 24th August 1683, and was buried in Bunhill Fields, being followed to the grave we are told by as many as sixty noblemen. Owen was the most voluminous, but by no means the most powerful writer among the Puritan divines. His prolix and passionless disquisitions, his dull, tedious, and exhausting argumentations, his lack of subtle spiritual perception, his ponderous and lumbering style make his writings the reverse of interesting; and one can almost pardon the irreverent criticism of Robert Hall, who pronounced them 'a continent of mud.' Yet Owen deserves respect for his learning and moderation, and for the nobility of his private character.

For his life, see the Rev. W. Orme's *Memoirs* (1820), and the *Life* by the Rev. A. Thomson, prefixed to the most complete edition of Owen's more than eighty works, that edited by Dr Goold (24 vols. Edin. 1850–55).

Owen, Sir Richard, one of the most eminent of zoologists, was born at Lancaster, July 20, 1804. From the grammar-school of that town he passed (1824) to Edinburgh University and extra-mural School of Medicine, and thence (1826) to St Bartholomew's Hospital in London, where he completed his course. He had barely started medical practice when he was called (1830) to help in cataloguing the Hunterian collections in the museum of the Royal College of Surgeons, to the curatorship of which he afterwards succeeded. In 1835 he married the only daughter of Clift, his colleague in the museum. Till 1856 he continued to produce a marvellous series of descriptive catalogues, while for more than twenty years (1834–55) he lectured as professor of Comparative Anatomy, for two years at Bartholomew's, and afterwards as Sir Charles Bell's successor at the College of Surgeons. Some of the results of his research and teaching are embodied in several well-known volumes on comparative anatomy and physiology. Meanwhile he had helped to give new life to the Zoological Society of London, of which he was for a time the unpaid prosector, while he had also worked willingly in various public interests—e.g. as a commissioner of health (1843–46), and for the Great Exhibition of 1851. In 1856 he became superintendent of the natural history department of the British Museum, where he continued his investigations on living and fossil animals, energetic moreover in such practical matters as the fit housing of this magnificent collection. He also continued to teach periodically at the Royal Institution and elsewhere, until his resignation of official duties in 1883. But even thereafter the veteran of fourscore years and more has persisted at work. Elected a Fellow of the Royal Society in 1834, president of the British Association in 1857, Associate of the French Institute in 1859, a Companion of the Bath in 1873, a K.C.B. in 1883, recipient of many scientific medals, degrees, and honorary titles from many nations, he gained above all the immortality of a true worker.

As a student Owen had also visited Paris and seen Cuvier, of whose school he became a prominent disciple, yet in his theoretical conclusions he rather supported Geoffroy St-Hilaire, against whose principle of the unity of organic structure he had heard Cuvier argue in 1831 before the French Academy. Marvellous industry and width of knowledge, anatomical insight and enthusiasm for palæontology, were as characteristic of Owen as of Cuvier, and their names will be linked while zoology lasts. Owen's anatomical and palæontological researches number towards four hundred, and concern almost every class of animals from sponge to man; he helped to elucidate the structure of many rare and interesting types, such as the Venus-flower-basket (*Euplectella*), the Brachiopod Lingula, the King-crab (*Limulus*), the Pearly Nautilus and the Argonaut, the Mud-fish Protopterus, many extinct reptiles and birds, the recently-lost Moa and the persistent Apteryx, the Aye-Aye and the Gorilla; he greatly advanced morphological enquiry by his clear distinction between *analogy* and *homology*, as well as by his concrete studies on the nature of limbs, on the composition of the skull, and on other problems of vertebrate morphology; while his essay on *Parthenogenesis* was a pioneer work of much historical importance in connection with theories of sex and reproduction. As a Pre-Darwinian, much influenced by the conception of 'archetypes,' Owen maintained a cautious, though by no means hostile, attitude to the more detailed evolutionist theories; his convictions, in short, are those of a Platonic anatomist. See a sketch of his life, with portrait, in *Nature*, xxii. (1880).

Owen, Robert, social reformer, was born a saddler and ironmonger's son, at Newtown, in Montgomeryshire, 14th May 1771. He had a poor education, and was put at ten into a draper's shop at Stamford, but a few years later shifted to Manchester, and by nineteen had risen to be the enterprising manager of a cotton-mill with five hundred hands. In 1799 he married the daughter of David Dale (q.v.), the philanthropic owner of the celebrated cotton-mills at New Lanark, on the Clyde, and, having induced his firm to purchase the concern, settled there next year as manager and part-owner. Here he laboured with constant zeal to teach his workpeople the advantages of thrift, cleanliness, and good order, and organised with a wisdom far before his time a system of infant education. In 1813 the business was reorganised, so as to give Owen a freer hand for his philanthropic schemes, under a firm content with a profit of 5 per cent., of which Jeremy Bentham and the Quaker William Allen were members. By this time Owen had thought out a religious creed for himself, and he now began his social propagandism in *A New View of Society, or Essays on the Principle of the Formation of the Human Character* (1813). His works at New Lanark quickly became famous, and attracted visitors from all parts of the world, while his advice on social questions was sought, if not always followed, by statesmen. Owen's thoughts on the pressing social questions of the day finally drove him to socialism rather than co-operation as a solution, but he lost much of his influence on the wider community by utterances on religion that were at least honest, if not discreet. His socialistic theories were put to the test of practice in experimental communities at Orbiston near Bothwell, and later at New Harmony in Indiana, at Ralahine in County Clare, and at Tytherly in Hampshire, but all were completely unsuccessful. In 1828 his connection with New Lanark finally ceased; and, his means having been exhausted in the American experiment, the remainder of his days were spent in restless secularist and socialistic

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propagandism. In his old age his mind fell into the comfortless vagaries of spiritualism. He died at his native town, 17th November 1858.—His son, ROBERT DALE OWEN, was born in Glasgow, 9th November 1800, and went to America in 1825 to help his father in founding his short-lived colony at New Harmony, Indiana. He finally settled in America in 1827, edited the *Free Inquirer* in New York, acted as a member of the Indiana legislature, and entered congress as a democrat in 1843. Later he helped to remodel the constitution of Indiana; acted first as *chargé d'affaires*, next as minister at Naples (1853–58); debated divorce with Horace Greeley; supported the cause of emancipation by vigorous and able pamphlets; and made his name widely known as one of the chief advocates of spiritualism in the United States. He died on Lake George, New York, 17th June 1877. Of his books need only be mentioned the spiritualistic *Footprints on the Boundary of another World* (1859), and *Debatable Land between this World and the Next* (1872); and *Threading my Way*, an autobiography (1874).—Two other sons, David Dale Owen (1807–60) and Richard Owen (born 1810), achieved contemporary eminence as geologists.

See SOCIALISM; G. J. Holyoake, *History of Co-operation in England* (1875); Owen's Autobiography (1857), and further, that edited by his son (1874); also the Lives by A. J. Booth (1869), W. L. Sargant (1860), and Lloyd Jones (ed. by W. C. Jones, 1890).

Owensboro, capital of Daviess county, Kentucky, on the Ohio, 160 miles below Louisville (112 by rail); a steam-ferry plies to Indiana. The chief trade is in tobacco and whisky, there being over a score of tobacco-factories and nearly as many distilleries here and in the vicinity. The city has also foundries, and flour and planing mills, &c. Pop. (1880) 6231; (1890) 9837.

Owens College, Manchester, which has developed into the VICTORIA UNIVERSITY, owes its origin to John Owens, a Manchester cotton-spinner, who, dying in 1846, left his fortune (£96,654) for the foundation of a college on an absolutely unsectarian basis, free from all tests of creed or subscription. By 1851 the college was built and opened with two faculties—(1) arts, science, and law, and (2) medicine (now including a school of pharmacy and a dental-surgery department); in 1873 the new college buildings were constructed, and the number of students was 1004; in 1891 they numbered 811, besides 439 evening students, and there were about eighty lecturers.

In 1874 Charles Clifton of Jersey City, United States, bequeathed his residuary estate (£21,571) for the extension of the department of mechanical arts and engineering, and in 1876 Charles Beyer of Manchester left to it by will £100,243. Other benefactions and subscriptions produced over £260,000 for its development and endowment. The idea of a university at Manchester, which had been mooted so long ago as 1641, and revived in 1789 and 1836, was at length carried out. In 1880 the Victoria University was fairly launched, though at first without the power of granting degrees in medicine and surgery. This last restriction was removed in 1883. The senate consists of the principal and the professors for the time being. The characteristic features of the university, as compared with other British universities, are these: (1) It does not, like London, confer degrees on candidates who have passed certain examinations only, but it also requires attendance on prescribed courses of academic study in a college of the university; (2) the constitution of the university contemplates its ultimately becoming a federation of colleges; but these colleges will not be situated like those of Oxford and Cambridge in one town, but wherever a college of adequate efficiency and stability shall have arisen. Besides Owens College, the Yorkshire College at Leeds and University College, Liverpool, have been already admitted, and in 1883 the Manchester and Salford College for Women was incorporated with it. Women enjoy full rights of studying, except the right to use the laboratories. There are two permanent fellowships, two others not endowed, and from thirty to forty scholarships and prizes. Many of these last, together with one of the fellowships, are open to competition by women as well as men. See *Owens College: its Foundation and Growth*, by Joseph Thompson (Manchester, 1886).

Owen Sound, a town and port of entry of Ontario, at the head of Georgian Bay, 122 miles by rail NW. of Toronto. It possesses a deep sheltered harbour (12 miles by 5), and has a large trade in lumber and grain, besides manufactures of furniture and wooden wares, machinery, woollen goods, &c. The Canadian Pacific steamers leave here for Port Arthur. Pop. 6000.

Owl (*Striges*), a sub-order of birds, constituting with two other sub-orders—the Pandiones (ospreys) and Falcones (hawks, falcons, and eagles)—the order Accipitres or Raptores (birds of prey). The owls, generally spoken of as 'the nocturnal birds of prey,' are distinguished by many well-marked characters. In size they vary from 5 inches to 2 feet in length, the females being as a rule larger than the males. The head is very large; the skull is broad, and the cranial bones are highly pneumatic; the facial region is flattened; the beak is short, hooked, strong, and sharp, never notched; at its base are bristles covering, more or less completely, both the cere and the nostrils. The eyes are very large, directed forwards, goggle-like, only slightly movable on account of the bony sclerotic plates being fixed firmly to one another and to the orbit; the upper eyelid is very large, and is the one principally concerned in closing the eye; both eyelids are ciliated with barbed plumelets and have a broad, thin, bare margin; the third eyelid, or nictitating membrane, is conspicuous; the iris is unusually broad, and is capable of being greatly expanded and contracted; the pupil is oval with the long axis perpendicular. A disc of feathers surrounds the eye, either completely or partly, and is supported by a ruff made up of rows of small, much-curved feathers inserted into the skin by stiff shafts. The ear is peculiar and variable; it has an external meatus, unusual in birds, generally of large size, and sometimes provided with a special flap of skin or operculum. The head often bears a pair of tufts known as feathered horns. The neck appears short, sometimes extremely so. The body, though really small, is apparently full, being covered with soft downy feathers without aftershafts. The plumage is generally spotted or barred with different shades of brown and yellow. In nearly all owls two different phases of colour, a darker and a lighter, can be distinguished, the two phases being often observed in different individuals of the same brood. The wings are always broad and long and loose. The tail is usually short and even, or slightly rounded. The oil-gland is destitute of the usual circlet of plumes. The legs are not long, and are almost completely feathered. The toes are often covered with feathers, and are always terminated by strong talons; the first and fourth toes can be opposed to the second and third. The mouth is very wide; the gullet is large; there is no crop; the stomach is large, roundish, and somewhat compressed; the intestine is short, and has two wide cæca connected with it. The indigestible portions of food are regurgitated in the form of pellets as in other Accipitres.

Owls range over the whole globe, from the extreme

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polar regions to the remotest oceanic islands. No birds are more cosmopolitan in their distribution. In habit they are generally nocturnal; their flight is noiseless and buoyant; their eyesight is very acute, as is also their sense of hearing. They are either solitary or live in pairs, and although so often regarded with superstitious aversion and animosity, they are nearly always harmless and very useful birds. Their food consists of small mammals, birds, insects—especially nocturnal lepidoptera; and some species prey on fish, either habitually or occasionally. They pounce upon their prey noiselessly, and, striking their talons into it, kill it and carry it off. Small animals may be carried in their bill, and are swallowed whole; larger animals, torn in pieces, are eaten in morsels. The disgorged pellets of indigestible materials—bones, fur, and feathers—produce a characteristic fetid odour near the owl's abode. The examination by Dr Altam of remains found (communicated to the German Ornithologists' Society) gives a good idea of the food and utility of the three commonest species of British owls.

No. of ejected pellets.	Bats.	Rats.	Mice.	Voles.	Shrews.	Moles.	Birds.	Beetles.
Tawny Owl.....210	..	6	42	296	33	48	18	48
Long-eared Owl.. 25	..	..	6	35	..	..	2	..
Barn-owl.....706	16	3	287	693	1590	..	22	..

The nesting habits of owls vary considerably. The nest is rudely made of twigs and grass, in holes of trees, crevices of rocks, dark corners of buildings, or on the ground; sometimes there is no nest at all, or only the forsaken one of some other bird. The eggs are usually white, either pure or yellow or blue tinted, and almost spherical, commonly four to six in number, but some species lay eight or ten, others not more than two. The young remain long in the nest, and are helped by their parents for some days after going abroad. Some owls are diurnal in habit, and these have more compact plumage, smaller ears, and incomplete discs; but the habits of owls in general are too little known to allow of many general statements being made regarding the adaptation of structures to particular habits. Though the small and unspecialised ear is said to characterise diurnal species, it is found in the eagle-owl, whose habits are nocturnal. Unfeathered legs are sometimes associated with fishing habits; but some feather-legged species catch fish, while other species with unfeathered legs do not. And again, feathered horns, which have sometimes been considered characters sufficiently important to serve as a basis for classification, have no known function, occur in widely-different species, vary much in size and form, and are not peculiar to either males or females. During the day nocturnal owls repose in some secluded spot, generally in a tree, but often on rocks and bushy cliffs, while some prefer the ground. If found abroad they are persecuted by other and smaller birds, being bewildered and rendered helpless by the unaccustomed glare of the daylight. When surprised, owls hiss like a cat and make a clicking noise with their bills; some have a harsh shrieking cry, others a not unmusical *hoot*.

The classification of the owls is at present in a very unsatisfactory state, owing to the difficulty of estimating properly the classification value of the various anatomical characters. According to the most generally received method (Sharpe's, in the *Catalogue of Birds in the British Museum*, vol. ii.), the sub-order Striges is subdivided into two families—(1) Strigidæ, containing only the two genera Strix and Phodilus, which embrace six species; (2) Bubonidæ, containing all the other owls—17 genera and about 190 species. (Newton subdivides the owls, which he reckons as a family of Accipitres, into two sub-families—(1) Aluconinæ, corresponding to the Strigidæ of Sharpe; and (2) Striginæ, corresponding to the Bubonidæ.) In the Strigidæ the sternum has no manubrium, and its margin is entire behind; the clavicles meet to form a furcula or merrythought, which is firmly united with the keel of the sternum; the tarsus is without a bony arch over the extensor tendon of the toes; and the claw of the mid-toe has its inner margin serrate. In the Bubonidæ, on the other hand, the sternum has a distinct manubrium, and has its margin notched behind; the clavicles are small and do not form a furcula, nor are they united with the sternum; the tarsus has a bony arch or ring over the groove which contains the common extensor of the toes; and the inner margin of the middle claw is not serrate.

The only British representative of the family Strigidæ is the Barn-owl, White Owl, Screech-owl, or Church-owl (*Strix flammea* of Linnæus). This, although the commonest British owl, is really a tropical bird, not ranging more than 40° north or south of the equator, except in western Europe, where it breeds as far north as Denmark and the south of Sweden. In Scotland it is found in the Inner Hebrides, Caithness, and the Shetland Isles. The adult male is about 13 inches long; the bill is white; the claws purplish gray; the face discs, which are oval in form and complete, are white. The general colour, which is light reddish yellow, mottled with gray on the upper parts, and white with small dusky spots on the under parts, distinguishes it from all other owls. The female is larger, but differs little in colour, except that the upper parts are darker. This owl is pre-eminently nocturnal in habit. It frequents villages, homesteads, and ruins, where it carries on its depredations among rats, mice, and other animals—as many as twenty rats have been found in the nest of one, all freshly killed. It has also been known to catch fish. Its cry is a discordant scream, and it also produces a snoring and hissing noise. If a nest is made it is merely a loosely-arranged collection of twigs and straws. The eggs number two to five, and are large and smooth and white. Several broods of young may be produced annually. Phodilus, the other genus of the Strigidæ, consists of only one species (*P. badius*), which ranges from the eastern Himalaya to Burma and Pegu, and is also found in Ceylon, Java, and Borneo. This genus possesses characters common to both families, and is really an intermediate form belonging properly to neither. A species from Madagascar, described by Alphonse Milne-Edwards under the name of *Heliodilus soumagnii*, has been placed in this sub-family.

Fig. 1.—Barn-owl (*Strix flammea*).

Among the Bubonidæ the Tawny Owl, Wood-owl, Ivy-owl, Brown Owl (*Strix stridula* or *aluco*, or *Syrnium aluco*) is a very common British species. It is found chiefly in wooded parts of England, and in the midland and southern districts of Scotland,

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but also as far north as Caithness and the Inner Hebrides. Its cry *hoo-hoo*, or *tu-whit*, *tu-whoo* at night makes it easily recognised. Although a species deserving to be preserved, it is rapidly declining in numbers. It ranges from the southern parts of Scandinavia through temperate Europe, in some parts of which, however, it is very local, to Asia Minor, Palestine, and Barbary. The Snowy Day-owl, the *Harfang* of the Swedes (*Strix* or *Surnia nyctea* or *Nyctea scandiaca*), is a circumpolar bird, breeding chiefly within the Arctic Circle, and common in parts of Greenland and Iceland. Its home is on the fjelds of Lapland, the tundras of Russia and Siberia, and the prairies of Arctic America, where it feeds on lemmings and other small rodents, sometimes on ptarmigan

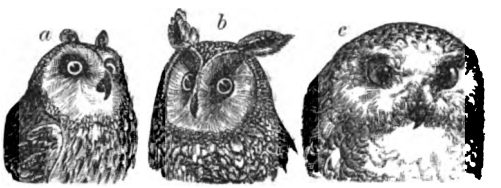

Fig. 2.—Heads of *a*, Short-eared Owl; *b*, Long-eared Owl; and *c*, Snowy Owl.

and willow-grouse, and even on the Arctic hare and on fish. In Shetland, where it has been known to breed, forced from its home by exceptional cold, and in other parts of the British Islands it is found generally in solitary, stony, and elevated places, preying chiefly on sandpipers. It is a diurnal bird of large size and vigorous rapid flight, with strong limbs, toes completely feathered, and large talons. Its white plumage, generally marked with dusky-brown spots, distinguishes it from every other owl. The Long-eared and Short-eared Owls of Europe, Asia, and America (*Asio otus* and *A. accipitrinus*), which are also common British species, have the ear peculiarly developed, the opening on one side looking upwards, and on the other downwards. The Long-eared owl, which frequents wooded localities, is about the size of the Barn-owl, and generally carries its horns erect; while the Short-eared, known also as the Woodcock-owl, from the coincidence of its time of appearance, prefers moors and open country, and carries its horns depressed. The specialisation of ear-structure is carried to its greatest known limit in Tengmalm's owl (*Nyctala tengmalmi*), a rare visitor to Britain from the northern regions; in it the bones of the head are developed differently on each side. The Eagle-owl (q.v., *Bubo maximus*), the Little Owl (*Athene noctua*), the Hawk-owl (*Surnia funerea*), and the very small Scops-owl (*Scops giu*) are the only other species recorded as found in Britain, and these are all very rare. Of foreign species belonging to this family one of the most noteworthy is the Burrowing Owl (*Speotylo* or *Athene cunicularia*) of America. On the prairies of North America it shares the burrows of the prairie-dog and other mammals, while on the pampas of South America it lives in the holes of the viscacha, armadillos, and large lizards, or makes a hole for itself, which is often invaded by rattlesnakes. Another interesting species is Pel's Fish-owl (*Scotopelia peli*).

Fig. 3. Foot of Snowy Owl.

Owlglass. See EULENSPIEGEL.

Ownership. See POSSESSION.

Owosso, or OWASSO, a city of Michigan, on the Shiawassee River, 78 miles by rail NW. of Detroit. The river supplies abundant water-power, and there are flour and planing mills, and furniture and sash and blind factories, besides foundries and railway-shops. Pop. (1890) 6544.

Ox. See CATTLE and BOVIDÆ.

Oxalic Acid, $H_2C_2O_4 + 2H_2O$, occurs in colourless, transparent, oblique, rhombic prisms, which have an intensely sour taste, and are soluble in nine parts of cold water, and much more freely in boiling water. When heated to 212° (100° C.) the crystals lose their two equivalents (or 28·5 per cent.) of water, and the residue, consisting of the anhydrous acid, $H_2C_2O_4$, becomes opaque. When the crystallised acid is rapidly heated to about 300° (149° C.), or when it is warmed with strong sulphuric acid, it is decomposed into carbonic acid and carbonic oxide gases, and into water. Oxidising agents, such as binoxide of manganese, peroxide of lead, nitric acid, &c., convert oxalic into carbonic acid, and on this property is based a good method of determining the commercial value of the black oxide of manganese. One of the most powerful of the organic acids, it expels carbonic acid and many other acids from their salts. The acid itself, which, like its soluble salts, is poisonous, is very widely diffused throughout the vegetable kingdom, sometimes in the free state, but more frequently as a salt of lime, as in rhubarb and many lichens. In the animal kingdom it never occurs except in minute quantity, and in combination with lime. It is produced by the action of either caustic potash or nitric acid upon most organic compounds of natural occurrence. Its most common mode of preparation is by the oxidation of starch or sugar by nitric acid. The organic compound and the nitric acid are heated in a flask till all effervescence has ceased, after which the solution is evaporated, and the oxalic acid separates in crystals on cooling. The most important salts are the oxalate of ammonia, $(NH_4)_2C_2O_4 + H_2O$, used as a test for lime, and the binoxalate of potash or salt of sorrel, $KHC_2O_4 + H_2O$, also known as essential salt of lemons, and which is popularly used for removing ink-stains or for cleaning brass.

The best test for this acid is the production of a white precipitate (of oxalate of lime), on the addition of any soluble salt of calcium. The precipitate is insoluble in water, in solution of potash, and in acetic acid, but dissolves in the mineral acids. A solution of nitrate of silver also gives a white precipitate of oxalate of silver, which explodes when heated.

In consequence of its employment in cotton-printing, bleaching straw, &c., oxalic acid is more accessible to the general public than many other poisons; and on this account instances of suicide from the swallowing of this acid are by no means uncommon. Cases of accidental poisoning, moreover, sometimes occur from its being sold by mistake for Epsom salts. Large doses destroy life very rapidly. With the view of converting the free acid in the stomach into an insoluble and inert salt, chalk, whiting, or lime-water, with full draughts of milk, should be administered with the least possible delay. Salt of sorrel is almost as poisonous as the pure acid.

Oxalideæ, or OXALIDACEÆ, a natural order of exogenous plants, allied to Geraniaceæ; including herbaceous plants, shrubs, and trees; with generally compound alternate leaves; calyx of five equal persistent sepals; corolla of five equal unguiculate petals, spirally twisted in bud; ten stamens; the ovary five-celled, with five styles; the fruit a capsule of five cells opening by five valves, or more rarely a berry with five one- or many-seeded

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cells. Temperate North America and the Cape of Good Hope may be said to be the headquarters of the order. The herbaceous parts of almost all the species are distinguished by a strong acidity, which is owing to the presence of oxalate of potash; some, however, are bitter and slightly stimulating. The fruit of some is pleasingly acid and cooling—as Carambola—and reputed to be antiscorbutic and antiseptic. The tubers of several of the typical genus (Oxalis) are eatable, and contain a considerable quantity of starchy matter. The leaves of all the species are more or less sensitive. The Wood-sorrel (*O. acetosella*) is a native of Britain, and one of the most elegant of the wild flowers, carpeting woods and shady places with its bright trifoliate leaves and white or rose-tinted flowers. Its leaves, resembling as they do those of the clover, have led to the surmise that it may be the true Shamrock (q.v.). The plant, which is antiscorbutic and refrigerant, is widely distributed throughout Europe, Russian and central Asia, and northern America. It is much used in salads on the Continent; and in Lapland, where it is very abundant, it is the favourite herb of the inhabitants. The expressed juice of the plant abounds in binoxalate of potash. Twenty pounds of fresh leaves yield about six pounds of juice, from which is obtained about two ounces of the pure salt.—*Salt of Sorrel* and *Essential Salt of Lemons* (see OXALIC ACID). The preparation is carried on mainly in Switzerland and Germany; not, however, exclusively from this species of Oxalis, but from several other species of the same genus and of the true sorrels (Rumex), which contain the same salt. The numerous species of Oxalis strongly resemble each other in their general appearance and properties. Several of them, such as *O. crenata* and *O. tuberosa*, natives of Peru and Bolivia, and *O. Deppei*, a Mexican species, are cultivated in those countries for the sake of their tuberous roots, which are eatable. These species have all been recommended for culture in Britain as substitutes for the potato, but their produce is too meagre to deserve attention; besides, the plants are constitutionally adapted only to the most favourable parts of England. *Averrhoa bilimbi*, or Cucumber-tree, indigenous to the East Indies, and now cultivated in some parts of South America, produces a green fleshy fruit of the shape and size of a small cucumber, which is esteemed for its grateful acid juice when ripe. The unripe fruit is also pickled.

Oxaluria, the occurrence of crystals of oxalate of lime in the Urine (q.v.).

Oxenford, JOHN, dramatist and critic, was born in Camberwell in 1812, and was originally educated for the bar, but early turned to a life of letters, made himself familiar with French, German, and Spanish literature, and soon made his name known by admirable translations of such notable books as Goethe's *Dichtung und Wahrheit* and Eckermann's *Conversations with Goethe*. For his last thirty years he was dramatic critic for the *Times*, and his criticisms were ever characteristic of the genial kindliness of his nature. He was a fluent and graceful writer, yet his original work suggested rather than demonstrated his powers as a critic. His *Illustrated Book of French Songs* (1855) showed a dexterous mastery of the lighter forms of verse. He wrote many plays, among them the *Dice of Death*, the *Reigning Favourite*, the *Two Orphans*, as well as the libretto for *The Lily of Killarney*, and one farce at least, *Twice Killed*, that became widely popular. He died February 21, 1877.

Oxenham, HENRY NUTCOMBE, theologian, was born at Harrow, November 15, 1829, and educated at Balliol College, Oxford, taking a classical second-class in 1850. He took orders in 1854, and held various curacies, but entered the Roman Catholic Church in 1857, and was successively professor at St Edmund's College, Ware, and master at the Oratory School, Birmingham. He died March 23, 1888. Oxenham translated Döllinger's *First Age of the Church* (1866), and *Lectures on Re-union of the Churches* (1872), also vol. ii. of Hefele's *History of the Councils of the Church* (1876); and, besides frequent articles in the leading reviews, the following learned works came from his pen: *Catholic Doctrine of the Atonement* (1865); *Catholic Eschatology and Universalism* (1876); *Short Studies in Ecclesiastical History and Biography* (1884); and *Short Studies, Ethical and Religious* (1885).

Oxenstierna, or OXENSTERN, AXEL, COUNT, Swedish statesman, was born at Fånö, north of Stockholm, 16th June 1583. He was originally educated for the church, and studied theology as well as jurisprudence at Rostock, Jena, and Wittenberg, and, although he entered (1602) the public service of his country, he continued all his life to take a deep interest in religious questions, and laboured zealously for the extension of the Protestant doctrines. Charles IX. despatched him in 1606 as ambassador to the court of Mecklenburg, and made him senator in 1609. Having displayed great prudence and wisdom in the settlement of disputes between the Livonian nobles and the town of Reval, he was appointed by Charles—now infirm from age—guardian of the royal family and head of the regency. On the accession of Gustavus Adolphus (q.v.) in 1611 Oxenstierna was created chancellor; and in 1613 acted as minister-plenipotentiary in the negotiations for peace between Sweden and Denmark, and in 1617 in those which terminated hostilities between Sweden and Russia. In 1621, on the departure of the king for the Polish war, Oxenstierna was charged with the administration of affairs at home, but five years later was summoned to act as governor-general of the conquered districts in Prussia. In 1629 he concluded peace with the Poles on highly favourable conditions. Although he strongly opposed the desire of Gustavus to take part in the Thirty Years' War, yet, when he found that the Protestant sympathies of the king were irrepressible, he supported his master most faithfully and ably; Gustavus in return charged him with the difficult business of managing the diplomatic relations of Sweden in central Germany. After the king's death it was Oxenstierna who not only kept the Swedish armies together, but sustained the Protestant cause and prevented it going to pieces on the jealousies of the German Protestant princes, displaying masterly diplomatic ability, great courage, resource, and moderation. Having in four arduous years reorganised the Protestants and reanimated their courage by gaining French and Dutch assistance, he went back to Sweden (1636). He had already drawn up a constitution, which the estates accepted and ratified in 1634. After his return he resumed the duties of chancellor, adding to them those of guardian to the young queen Christina, who, however, did not accept the advice of her father's wise friend and counsellor as it beseemed her. Oxenstierna continued to direct the policy of the Protestants in Germany till the peace of Westphalia in 1648 put an end to the war. He humiliated the Danes and forced them to sign the treaty of Brömsebro (1645), and opposed the abdication of Christina and the succession of Charles X. This king, nevertheless, retained him in office until he died, 28th August 1654. See Lundblad's *Svensk Pluturch* (2 vols. Stock. 1824); Fryxell's *History of Gustavus Adolphus;* Geijer's *History of the Swedes* (Lond. n.d.); and *Journal* of Bulstrode Whitelocke (1772). His *Writings and Correspondence*

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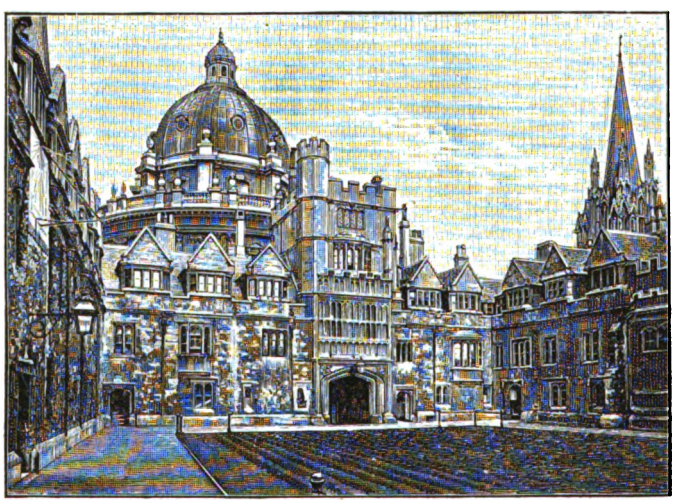
began to appear in 1888.—His eldest son JOHAN (1611-57) carried through several diplomatic missions, his greatest service being to act as Sweden's plenipotentiary at Osnabrück (1648). It was in a letter to this son, who felt himself unequal to the office, that the chancellor used the famous phrase, 'Nescis, mî fîlî, quam parva sapientia regitur mundus.' This aphorism is current, however, in an extraordinary number of versions (*Notes and Queries*, 7th July 1888).—The younger brother ERIK (1624-56) was governor of Esthonia (1640), and succeeded his father as chancellor of the kingdom.

Ox-eye. See CHRYSANTHEMUM.

Oxford, the capital of the county, the home of the university, and the seat of the bishopric of the same name, stands about the confluence of the rivers Cherwell and Thames, 52 miles (63 by rail) WNW. from London. The city, under the Act of 1889, is governed by a council, comprising a mayor, fifteen aldermen, and forty-five councillors, of whom three aldermen and nine councillors are elected by the university. Up to 1885 the city returned two members to parliament; since that date only one. Until about 1830 the area and population of the city remained almost stationary, extending only a little beyond the limit of the old city wall as reconstructed in the reign of Henry III., and very little beyond the area represented in Loggan's bird's-eye view (1675). But since then the city has grown rapidly, and the rural districts of St Giles' on the north, St Clement's on the west, Grandpont on the south, and Botley on the east have been covered with lines of close-built streets. Pop. (1801) 11,000; (1851) 25,700; (1881) 40,800; (1891) 53,000.



Brasenose College, Oxford—The Quadrangle (showing also Spire of St Mary's and Dome of Radcliffe Library).

The topography of Oxford is simple in the extreme. The river Thames (locally called the 'Isis'), which has flowed from north to south, takes here a sharp bend to the east, and about a mile from the angle receives the Cherwell, flowing from the north, parallel with its former course. All the old part of the town stands in the rectangle thus formed by the rivers. The centre of the town is at a place called 'Carfax' (derived from *quadrifurcus*, 'four-forked'), from which four main streets run to the four points of the compass. From Carfax, since 1883, tram-lines run to the four points of the compass. Taking in rotation these four lines of streets, we shall be able to pass quickly in review all the chief buildings and places of interest. *North* runs Cornmarket Street ('the Corn'), containing the Roebuck and Clarendon Hotels, past the latter of which is the entrance to the Oxford Union Society's rooms (the club, library, and debating-hall of the undergraduates, founded in 1823). At the end of Cornmarket Street is St Michael's Church, the tower of which (*c.* 1070) is a characteristic specimen of Saxon masonry. Here formerly was the north gate of the city, the chambers over which (taken down in 1771) were used as a prison, and called Bocardo. From the end of Cornmarket Street, George Street runs west, containing the New Theatre (1886) and the High School for boys (1881); Broad Street runs east, containing Balliol, Trinity, and Exeter Colleges, the Ashmolean Museum, the Sheldonian (the University 'Theatre'), the Clarendon Building (used for the Clarendon Press till 1830, now as university committee-rooms), and the Indian Institute (a library, museum, &c., for natives of India and members of the Indian Civil Service studying in Oxford, opened 1884). Broad Street was the place where the Oxford martyrs were burned (Ridley and Latimer on 16th October 1555, and Cranmer on 21st March 1556). The Martyrs' Memorial, a cross in their honour, was built in 1841, at the end of Magdalen Street, the continuation of Cornmarket Street. Beaumont Street leads west from this point, past the Randolph Hotel (built 1864), the Taylor Library (for modern literatures, founded by Sir Robert Taylor, built 1845), and the University Galleries (containing the Ruskin Drawing-school, the Arundel Marbles, presented to the university in 1667, and other relics of classical antiquity, a valuable collection of paintings and engravings, and 190 original drawings by Michael Angelo and Raphael), to Worcester College. Thence northwards, by Walton Street, access is got to the University or Clarendon Press (removed to new buildings here in 1830), to St Barnabas Church (1868), to Port Meadow (an extensive flat ground beside the river, being the common of the freemen of the city), and the 'Upper River' or part of the Thames north of Oxford, and so to Godstow, a ruined nunnery, famous as the burial-place of Fair Rosamond. Returning to the Martyrs' Memorial, the street leading north from Magdalen Street (so called from St Mary Magdalene Church), is St Giles' Street, containing St John's College and the Pusey House (a library and clergy-house, in support of Anglican principles, established 1884 in memory of Dr Pusey, and containing his library). In the Woodstock Road continuation of St Giles' Street are the church of St Aloysius (Roman Catholic), built in 1875, the Radcliffe Infirmary (1770), and the Radcliffe Observatory (1795). In the Banbury Road continuation of St Giles' Street are Somerville Hall (a ladies' college, 1879), the High School for girls (1884), and Wycliffe Hall (a Church of England theological college, in the interests of the Evangelical party, 1877). *West.*—Returning to Carfax, and taking another quarter of the city, Queen Street, continued by New Road, leads past the Castle (including the court-house and gaol) to the railway stations, and so along the Seven Bridges Road (across cuts from the Thames) to Cumnor.

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South from Carfax runs St Aldate's Street, past the town-hall (built 1752), public library, corn exchange, and post-office (1881), St Aldate's Church (rebuilt since 1863), Pembroke College, the front of Christ Church, the entrance to Christ Church Meadow and Broad Walk, to Folly Bridge across the Thames. This bridge was rebuilt in 1815. Over the old bridge was a watch-tower (taken down in 1779) known as 'Friar Bacon's Study.' From near Folly Bridge, for about a quarter-mile along the north bank of the river, are moored the Barges (q.v.) of the university and college boat-clubs.

East from Carfax runs High Street in a graceful curve. In the High Street itself, or just off it, stand these buildings, in this order from Carfax: the city market (1773), the Mitre Hotel (extant, as Dagville's Inn, before 1470), the church of All Saints (built in 1706 from designs by Dean Aldrich), the new front of Brasenose, the University Church (St Mary the Virgin), where are preached the university sermons (including the 'Bampton Lectures,' q.v.), All Souls, University, and Queen's Colleges, the Examination Schools (1882), with the Non-collegiate Students' buildings, Magdalen College School (founded 1480), Magdalen College, and the Botanic Gardens (laid out in 1632). The street ends with Magdalen Bridge over the Cherwell. From this bridge roads lead to Cowley and Iffley, past the college cricket-grounds and the running-ground of the University Athletic Club. At Cowley is a college for army candidates, called the Oxford Military College, opened in 1876, and the barracks of the Oxford military depôt. At the church of All Saints, Turl Street runs north from the High, leading to Lincoln, Jesus, and Exeter Colleges, and so into Broad Street at Trinity College. From opposite St Mary's Church, Oriel Street leads south past Oriel College and the Canterbury gate of Christ Church into Merton Street, where are Corpus Christi and Merton Colleges. From St Mary's Church, Catherine or Cat Street leads north, having on the east the Codrington Library (built about 1720 by All Souls College to receive the library of Christopher Codrington, and maintained by the college as a law library), and on the west the Radcliffe Library (built in 1737 as a library for medicine and natural science; since 1861 a reading-room in connection with the Bodleian); and farther on the Old Schools (including the Bodleian Library and the Divinity School) on the west, and Hertford College on the east. Past Hertford College a street leads to New College. Cat Street, after crossing Broad Street, is continued by Park Street, which leads northwards past Wadham College and the garden front of Trinity College to the University Museum, Keble College, and Lady Margaret Hall (a ladies' college, opened about 1880). Here are the University Parks, laid out and kept up by the university. They contain the university observatory, erected in 1874. Here are played most of the football matches (Rugby, Association, Winchester, and other varieties of the game) of the university and college clubs. Here also is the new ground of the University Cricket Club, one of the finest in itself, and in its surroundings, in England. A walk leading from the Parks, east and south, is known as 'Mesopotamia,' being between two cuts of the Cherwell.

ALL SOULS COLLEGE was founded in 1437 by Archbishop Chichele as a chantry for the souls of those who had fallen in the wars with France. It remains still a college entirely of fellows; several of the fellowships have been attached to university professorships. The front quadrangle is practically as the founder left it; the fine chapel (consecrated 1442) contains a beautiful reredos, partially destroyed in 1577 and in 1664, but restored in 1876. The hall (built in 1720) contains some good portraits of former fellows, among them those of Sir William Blackstone, Reginald Heber, Sir Christopher Wren, Thomas Tanner, John Linacre, Jeremy Taylor, and Herrick.

ASHMOLEAN MUSEUM, the earliest public museum in England, built in 1682 to receive the antiquities, &c. of Elias Ashmole (q.v.). The original collections have since 1860 been dispersed; the books and MSS. going to the Bodleian, the natural history specimens to the Museum, the anthropological (including curiosities brought home by Captain Cook) to the Pitt-Rivers collection. The museum now contains British antiquities, antiquities from Cyprus, Egypt, &c.

BALLIOL COLLEGE, founded about 1268 by Devorguilla Balliol, mother of John Balliol, king of Scotland. The buildings are chiefly modern, the hall (1877) being a favourable example of recent Oxford building. This hall contains portraits of John Wyclif the Reformer, formerly master of the college; of Archbishop Tait; of Robert Browning, honorary fellow; and of Benjamin Jowett, master. By means of the Snell and Warner exhibitions, Balliol has had since the 17th century a close connection with Scotland, including among its members Adam Smith, John Gibson Lockhart, Sir William Hamilton. Colet, Parsons the Jesuit, John Evelyn, Robert Southey, Dean Stanley, Matthew Arnold, A. C. Swinburne, and Cardinal Manning were members of the college.

BODLEIAN LIBRARY (q.v.), founded in 1602 by Sir Thomas Bodley, in a room (built about 1460) over the Divinity School for the old library of the university, augmented by Humphrey, Duke of Gloucester. Duke Humphrey's Library had been plundered by King Edward VI.'s commissioners. The library has grown to be one of the great libraries of the world; it contains more than 30,000 MSS. and 500,000 books, and now occupies the whole of the Old Schools (built 1618) of the university. The library contains a fine portrait of the founder. The picture-gallery attached is one of the finest extant examples of an 'ambulacrum,' or room for walking in, found in old great houses. On its walls hang portraits of many benefactors and famous members of the university; also many historical portraits—e.g. Lord Burleigh, Mary Queen of Scots, Prince Henry (son of James I.), James Edward the Old Pretender, &c.

BRASENOSE COLLEGE, founded in 1509 by William Smyth, Bishop of Lincoln, and Sir Richard Sutton. The gateway tower (1512) is the most striking feature of the old building. The old 'brasen nose' knocker of Brasenose Hall, on the site of which the college was built, was (it is claimed) acquired in 1890, and is now found in the hall. John Foxe, Robert Burton, Dean Milman, Barham, and F. W. Robertson were students.

CHRIST CHURCH is both the cathedral of the diocese of Oxford and a college of the university. The cathedral was instituted in 1546 by King Henry VIII. in the church of the old priory of St Frideswide (q.v.). This church contains many remains of Norman architecture (1120–80), and (it is claimed) some fragments of the older Saxon church. The college was founded by Cardinal Wolsey in 1525 as 'Cardinal College,' the priory of St Frideswide being suppressed by him; was remodelled by the king as 'King Henry VIII.'s College,' in 1532; and finally settled, as 'Christ Church,' in 1546. The hall and the kitchen (1529) are Wolsey's work, and surpass any building of the kind in Oxford, or even in England. The great quadrangle ('Tom' Quad.) begun by Wolsey was not completed till 1668. Peckwater Quadrangle was rebuilt in 1705–61. The entrance tower (finished 1682) now contains 'Great Tom,' one of the largest bells in England, being the great bell of Osney Abbey recast (see BELL, Vol. II. p. 55). The 'Broad Walk' of elms leading from the Meadow Gate to the Cherwell, planted by Dean Fell (q.v.) in 1670, was long one of the finest avenues in England; but its glories have been lessened of late years by storms, the elm being unable to outlast two centuries. The library contains a valuable collection of paintings, especially by great Italian masters, with a few of the Dutch masters. The hall contains many portraits of eminent statesmen and divines by great painters, from Holbein to Millais. Sir Philip Sidney, Camden, George Peele the dramatist, John Locke, Sir George Cornewall Lewis, Dr Liddon, Gladstone, and John Ruskin are a few of the famous names of Christ Church men.

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CORPUS CHRISTI COLLEGE, founded in 1516 by Richard Fox, Bishop of Winchester, in the interests of Renaissance learning. Cardinal Pole was a student here, Richard Hooker a fellow, John Keble a scholar.

DIVINITY SCHOOL, built 1445–80, a splendid example of Perpendicular architecture. The university was too poor to finish it, portions of the work showing that the carving of the interior was designed to be much more elaborate than it is. The rich colours of the roof and the stained windows were destroyed in Edward VI.'s reign.

EXETER COLLEGE, founded in 1314 by Walter de Stapledon, Bishop of Exeter. The buildings of the college have been much extended in the present century, and are nearly all modern. The chapel (1858) is a fine example of Sir Gilbert Scott's work, and contains good specimens of modern painted glass and tapestry. Members have been Grocyn, Glanville; Bishops Bull, Prideaux, and Secker; Lyell, Maurice, and Froude.

HERTFORD COLLEGE, founded in 1874 by T. C. Baring, M.P., in the interests of the Church of England. This college was erected out of Magdalen Hall (founded 1487), which had been removed to this site in 1822 from its former site near Magdalen College. The site had previously been occupied by Hart Hall, founded about 1284, which had been erected by Dr Richard Newton into Hertford College in 1740, but dissolved in 1818 for lack of funds. The 'learned' John Selden was a member of Hart Hall; so also was Charles James Fox. William Tyndall and Clarendon were members of Magdalen Hall.

JESUS COLLEGE, founded in 1571 by Queen Elizabeth at the instance of Dr Hugh Price, and its revenues greatly augmented by Sir Leoline Jenkins, principal of the college (1661). Until the Commission of 1855 the college had an exclusively Welsh connection; this has been further broken by the Commission of 1877, but there are still several scholarships and exhibitions confined to persons of Welsh birth and education. The college contains good portraits of Queen Elizabeth, the nominal foundress, and of Charles I., a benefactor. The library possesses many valuable Welsh MSS.

KEBLE COLLEGE, founded in 1870 by subscription, in memory of John Keble and in the interests of the Anglican Church. The ornate chapel is the chief object of interest. The hall contains a portrait of Keble. In the library is Holman Hunt's picture, 'The Light of the World.' The college has a different constitution from other colleges, having no fellows and being governed from without by a council.

LINCOLN COLLEGE, founded in 1429 by Richard Fleming, Bishop of Lincoln, and refounded in 1474 by Thomas Rotheram, Archbishop of York, to check the progress of Lollardism. The chapel (1631) is a good specimen of Stuart work, containing fine cedar panelling and painted glass. Among its fellows have been Robert Sanderson, George Hickes, John Kettlewell (the non-juror), John Wesley, John Radcliffe.

MAGDALEN COLLEGE, founded in 1458 by William Waynflete, Bishop of Winchester. This college, in its original quadrangle, cloisters, hall, and chapel, built 1474–81 in the founder's lifetime, possesses the finest buildings of any college in the world. The tower, built 1492–1505, on whose top the choir sing a Latin hymn on May Day, is ascribed traditionally to the initiative of Cardinal Wolsey when bursar here. The buildings in the Grove or Park, built 1736, were at one time regarded in Oxford as the perfection of architecture. A new quadrangle to the west (called St Swithin's Buildings) was added in 1885. The musical services in chapel have for centuries been famous. Among the members of this college have been Colet, Latimer, John Hampden, Joseph Addison, Edmund Gibbon. The college has a fine walk round an island formed by two branches of the Cherwell, the northern side of which is called 'Addison's Walk.' The heroic age of the college was the period 1685–88, when its resistance to the arbitrary measures of James II. gave it a foremost place in the history of England.

MAGDALEN HALL, see Hertford College.

MANCHESTER NEW COLLEGE, a college for the study of theology independent of creed, has been removed from London to Oxford. Buildings for it were erected in 1891 in Holywell, the north-eastern suburb of Oxford.

MANSFIELD COLLEGE, the chief theological college of English Nonconformity, was transferred to Oxford in 1886. Large buildings for it have been erected on a site at the back of Wadham College.

MERTON COLLEGE, founded in 1264 at Malden in Surrey, and transferred to Oxford in 1274 by Walter de Merton, Bishop of Rochester, was the first institution in Oxford organised as a college; and is therefore the type which has been imitated by all existing foundations in Oxford or Cambridge. The old quadrangle ('Mob Quadrangle,' 1278) and the library (1376) of this college are the most primitive college buildings in Oxford. The chapel (1424) is a fine building, with some good early brasses. Members of Merton College have been remarkable benefactors to the university; Sir Thomas Bodley, who founded the university library, and Sir Henry Saville, who founded professorships in geometry and astronomy, were both fellows. Duns Scotus is said to have been fellow here; William Harvey, discoverer of the circulation of the blood, was warden; and other members were Bishops Hooper, Jewel, and Patteson; Anthony Wood, the great Oxford antiquary (buried in the ante-chapel, 1695); and Steele.

MUSEUM, the 'New Museum,' was built in 1857 to 1860, for the reception of the university medical and natural science collections, and the medical and scientific library of the Radcliffe trustees, and the accommodation of the university teachers in science. Large additions have since been made, particularly in the departments of chemistry, electricity, anatomy, and physiology. A new wing was added in 1887 to receive the remarkable anthropological collection of General Pitt-Rivers.

NEW COLLEGE, founded in 1379 by William of Wykeham, Bishop of Winchester. Walter de Merton's college had so far been the only well-established society in Oxford, and was therefore known as 'the college' *par excellence*. Wykeham's college was therefore known as 'the new college;' a name which it has retained to the exclusion of the name the founder gave it, 'St Mary of Winton College.' Wykeham founded also Winchester College to be a school to supply his Oxford college. The hall, chapel, cloisters, bell-tower, and other buildings were on a scale hitherto unknown in Oxford, and, except at Magdalen and Christ Church, have had no rivals. The gardens are very beautiful, and are bounded by the only perfect segment of the city wall. The best-known names of members of this college are Archbishop Warham; William Waynflete, founder of Magdalen College; Henry Chichele, founder of All Souls; Bishop Ken; Sydney Smith; and Augustus Hare.

NEW INN HALL, founded about 1369, was closed in 1887. During the Civil War, when Charles I. held Oxford, in 1642, the royal mint was set up here, and the old plate of the colleges was coined for the king's use.

ORIEL COLLEGE, founded in 1326, nominally by King Edward II., but really by Adam de Brome, his almoner, in a house on the High Street, removed in 1329 to 'la Oriole,' a house on the present site, whence it has its modern name. For a long time it was known as 'King's College' (Collegium Regale). The buildings are modern, the hall and chapel dating from 1637. William Langland, author of *Piers Plowman*, was, but erroneously, at one time believed to have been fellow here. Sir Walter Raleigh was probably commoner for a short time. In the first half of the 19th century Oriel College possessed a most distinguished body of fellows—Keble, Pusey, Thomas Arnold, Archbishop Whately, Cardinal Newman, Arthur Hugh Clough.

PEMBROKE COLLEGE, erected in 1624 by Thomas Tesdale and Richard Wightwick, out of Broadgates Hall, a most ancient place of academical study, in which Bishop Bonner, Beaumont the dramatist, and Sir Thomas Browne had been students. The name was given in compliment to the Earl of Pembroke, then chancellor of the university, and in hope of a godfather's gift from him, which his death soon after prevented. Members of this college (and hall) have filled the three Anglican primatial sees of Canterbury (Moore, 1783), York (Yong, 1561), Armagh (Newcome, 1795). Dr Johnson was a student here.

QUEEN'S COLLEGE, founded in 1340 by Robert de Eglesfeld, chaplain to Philippa, queen of Edward III. He arranged that the queen-consort of England for the time being should be patroness of the college; hence its name, and several donations by queens of England when the college was in difficulties. The college was rebuilt in 1707–14. Henry V. is said to have been a student here for a short time; and other members were Cardinal Beaufort, Wycherley, Addison, and Collins. The college retains the old ceremony of bringing in the 'Boar's Head,' with the traditional song, on Christmas Day.

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St Alban Hall, founded about 1230, was united to Merton College in 1882.

St Edmund Hall, founded about 1260. Queen's College appoints the principal. Thomas Hearne, the antiquary, was long resident here.

St John's College, founded in 1555 by Sir Thomas White. The chapel, hall, entrance tower, and part of the street front of the outer quadrangle are substantially those of St Bernard's College, a house of the Cistercian monks, built here 1437–1530. The garden front of the inner quadrangle was built by Archbishop Laud (q.v.) in 1631. Members of this college have deserved well of the university, Archbishop Laud and Dr Richard Rawlinson having been principal benefactors to the Bodleian. Edmund Campion, Shirley the dramatist, Edmund Calamy, and Dean Mansell are other St John's names.

St Mary Hall, founded in 1333 by Oriel College. The hall long retained a close connection with Oriel, and a fellow or ex-fellow of Oriel has generally been principal. The statutes of 1877 contemplate the ultimate incorporation of the hall into the college.

Sheldonian Theatre, built in 1669 by Archbishop Sheldon for the holding in it of the great university degree ceremonies. These had hitherto been held in St Mary's Church, but the riotous conduct of the spectators (in 1652 the undergraduates had to be kept in order by soldiers of the garrison) often scandalised those who had regard to the sacred character of the building. The 'act' (the degree-ceremony in which all M.A. degrees and doctors' degrees granted during the year were supposed to be completed by 'inception') is now superseded by the Encænia, in which prize compositions are recited (among them the 'Newdigate,' q.v.), honorary degrees are conferred, and a Latin oration delivered.

Trinity College, founded in 1554 by Sir Thomas Pope. The library is part of Durham College which stood here (see Durham); the hall dates from 1620; the chapel, with its fine carved cedar, from 1694; the garden quadrangle was built 1665–1728; and large new buildings were added in 1887. The 'Lime Walk,' planted in 1713, is the feature of the garden. Kettell Hall, on Broad Street, near the college, built in 1615 by Ralph Kettell (president of Trinity), is a characteristic example of Oxford architecture of the period. Chillingworth, Selden, Denham, Aubrey, Thomas Warton, Landor, Newman, and Freeman were members.

University College had its origin in an endowment left in 1249 by William of Durham for the maintenance of some graduates of the university. This was at first administered by the university itself, and the institution called the university's Great Hall, 'Magna Aula Universitatis,' in distinction probably from some smaller 'halls' which the university owned. Afterwards the administration of the trust was committed to the beneficiaries themselves; and, under the influence of the example of Walter de Merton's foundation, the society became a college. In the 14th century there grew up a legend that the building occupied the site of a college founded by King Alfred, destroyed in the Danish invasion. By a later effort of imagination King Alfred was said to have founded University College in 872 A.D. University College was a great power in Oxford in 1686–88, when its master, Obadiah Walker, was the chief agent in the Roman Catholic effort to reconquer Oxford. The lawyers Lord Eldon and Lord Stowell, Sir William Jones, and the poet Shelley were members of this college.

Wadham College, founded by Dorothy, widow of Sir Nicholas Wadham, in 1613, on the site of the old Austin Friary. The beautiful gardens of this college perhaps owe something to the labours of the friars. The college buildings are an exquisite specimen of Jacobean work; the street front in particular is one of the prettiest bits in Oxford. Admiral Blake was a student here, and his portrait is in the hall. The Royal Society took its origin in meetings in the rooms of Dr John Wilkins, warden of Wadham.

Worcester College, founded by Sir Thomas Cookes of Worcestershire in 1714, in Gloucester Hall. Gloucester Hall had in 1560 succeeded Gloucester College, a college for Benedictine monks, founded in 1283, dissolved at the Reformation. Each monastery had its own building; and a row of these, forming one side of Worcester College quadrangle, each with the coat of arms of its monastery carved in stone over the door, is one of the most interesting bits of old Oxford. During the earlier part of Elizabeth's reign Gloucester Hall was filled with Roman Catholic students, their tutors being graduates who had been ejected from their fellowships in various colleges for refusing the oath of allegiance. In the 17th century there was for some time a project to found here a college for the education of clergy of the orthodox Greek Church. Lovelace, Sir Kenelm Digby, and De Quincey were members.

The university of Oxford is a corporation under the title of 'the chancellor, masters, and scholars of the university of Oxford.' It consists of a body of graduates (masters of arts and graduates in law, medicine, and divinity) who are the governing members of the corporation, and of a body of undergraduates (and bachelors of arts) who are 'in statu pupillari,' that is, subject to the government of the officers of the university and without voice in university business. The statutes by which the university is governed are partly the code promulgated in the chancellorship of Archbishop Laud, partly the body of enactments issued by a parliamentary commission in 1877. The business of the university is formally transacted in three houses: (1) the Ancient House of Congregation, consisting of masters of arts of less than two years' standing, heads of colleges, deans of degrees of colleges, professors, examiners, &c., in which the ceremonial business of conferring ordinary degrees is conducted; (2) the House of Congregation, constituted by act of parliament in 1853, consisting of university officers, professors, and resident graduates (in 1891 there were 391 graduates resident), in which proposed statutes are submitted for discussion and vote; (3) the House of Convocation, consisting of all graduates who have kept their names on the books (5966 in 1891), which is in theory the supreme governing body of the university. Thus, all statutes and decrees of the university are voted upon in convocation, and it is convocation which elects the two members whom the university returns to parliament. Practically, however, the business of the university is in the hands of the Hebdomadal Council and of small committees, called delegacies (or curators). Council began as a committee of heads of houses, invented under Stuart absolutism to control the free spirit of the university. It now consists of the vice-chancellor and proctors, and eighteen persons elected by convocation, six being heads of houses, six professors, and six graduates. Council retains the initiative in all legislation, the control of most of the negotiations in which the university takes part, the nomination of persons to receive honorary degrees, and the like. Committees govern the institutions of the university, such as the Bodleian Library, the University Chest, the University Press, and the Museum. The chief officers of the university are (1) the chancellor, the official head of the university, generally a peer of the realm, elected for life by convocation; (2) the vice-chancellor, nominated by the chancellor from the heads of houses in rotation, and holding office (as a rule) for four years; (3) the two proctors, holding office for a year, elected by the graduates of the colleges according to a cycle, each college getting its turn to elect a proctor every eleventh year. The proctors are specially charged with the discipline of the university as regards its junior members. Each college of the university is a distinct corporation, self-governed according to its own statutes under sanction of the parliamentary commissions of 1852 and 1877.

The earliest historical notice of Oxford shows also its importance in early times. In 912 A.D. the Saxon Chronicle records that, on the death of Ethelred, Edward (the son of Alfred) took possession 'of London and Oxford and all the lands obedient to those cities.' The remarkable Castle mound,

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now shamefully included in the precincts of the county gaol, was heaped up at this period, being part of the great system of fortifications which were then raised against the Danes. During the troubled years which follow Oxford is frequently mentioned, its position just between Mercia and Wessex rendering it important as a citadel against invasion, and as a place of parley between Danes and Saxons. It may be inferred that at the Norman Conquest Oxford offered a stubborn resistance to the invader (1) from the great number of 'waste' houses mentioned in the Domesday survey; (2) from the vastness of the work erected by the conqueror's governor, Robert Doyley, to overawe the city and district. Two portions of this work remain, the tower (now of St Michael's Church) which commanded the approach to the assailable North Gate of the city, and the great keep of the Castle (now in the precincts of the gaol). In the contest for the crown between the Empress Maud and Stephen (1142) Oxford was again a place of capital importance, Maud taking refuge in Oxford when driven from London, and escaping over the frozen Thames when the castle was about to surrender to Stephen after ten weeks' siege. Here in 1258 the 'mad parliament' enforced on Henry III. the scheme of reform known as the Provisions of Oxford (see MONTFORT). From this date Oxford as a town ceases to be of national importance, except for a few years in the heat of the great Civil War, when Charles I. made it the centre of his operations, the station of his court, and the meeting-place of the 'parliament' which he had brought together in opposition to that 'Long' one at Westminster.

But at the very time when Oxford, as a city, was losing its political and strategical importance there was growing up within it a distinct, and destined often to be a hostile, corporation which was to make it for centuries the intellectual capital of England. The word 'university' implies now a corporate body of teachers and students, established for the pursuit of the higher branches of learning, endowed with privileges and protected by charters granted by sovereign powers; and we find by the end of the 12th century and the beginning of the 13th a corporation of this kind established in Oxford. But this corporation must have been only the official recognition of a guild of teachers with their pupils which was already in existence in the city; and a guild of this kind must, in its turn, have been the development of accidental, and perhaps temporary, assemblages of teachers and students. The beginning of the university of Oxford is therefore to be carried as far back as the earlier third of the 12th century; Thibaut d'Estampes (Theobaldus Stampensis) about 1120, and Robert Pullein in 1133, being recorded to have taught in Oxford. The university, thus begun under Henry I. (who in 1130 built as a royal residence Beaumont Palace in the north suburb of Oxford, in which palace Richard Cœur de Lion was born in 1157), rapidly grew in numbers and in prestige; and by the beginning of the 13th century we find popes and kings interested in its fortunes, its scholars numbered perhaps by thousands and not by hundreds, and the feuds between it and the town occasionally events of almost national importance. Teachers and scholars in this early university were of the secular clergy; they lived and taught in houses ('halls') and lecture-rooms ('schools') hired from the townsmen; and discipline was practically non-existent.

The fame of the university attracted to Oxford the four great orders of mendicant friars immediately after their arrival in England, the Dominican (Black) Friars coming in 1221, the Franciscan (Grey) Friars in 1224, the Carmelite (White) Friars in 1253, and the Austin Friars in 1268. The friars, unlike the older orders of monks, who had stood aloof from secular learning, threw themselves with enthusiasm into the studies of the university; and the 'schools' in their convents and their lecturers soon eclipsed the fame of the secular schools and teachers. That Oxford can boast the greatest names in mediæval learning and legend, Roger Bacon and Friar Bungay, is due to these conventual schools. So threatening did the supremacy of the friars become that the university in the early 14th century had a hard fight with them to retain the control of its own education (see the Rev. H. Rashdall's paper on 'The Friars Preachers *versus* the University' in the Oxford Historical Society's *Collectanea*, vol. ii. 1890).

The intellectual triumphs of the friars kindled the spark of emulation in the older monastic orders, and they in their turn began to found conventual schools at Oxford for students of their own body. The Benedictines had four colleges in Oxford: Gloucester College, founded in 1283, part of whose buildings are now in Worcester College; Durham College, perhaps begun in 1290, partly now in Trinity College; Canterbury College, founded in 1363, now taken into the site of Christ Church; and St Mary's College, founded in 1435, now a dwelling-house belonging to Brasenose. For the Cistercians St Bernard's College was founded in 1437, and parts of this building are still found in St John's College.

The introduction into the university of the conventual system, with the severity of its discipline, the interpenetrating stimulus of its common life, and the efficiency of its personal tuition, suggested a change in the university of secular students which was to effect in time an entire revolution in its form. In 1264 Walter de Merton conceived the plan of bringing together into a common home a number of secular students, engaged in academic studies but subject to something like conventual discipline. In 1274 he moved his college (which he had established at Malden in Surrey) to Oxford. Two other institutions, which had been founded in Oxford at a slightly earlier date, soon, under the influence of the new idea, took the shape of Balliol and University Colleges. By 1525 ten other colleges had been instituted, among them such great designs as New College, Magdalen College, and Wolsey's Cardinal College (afterwards reconstituted by Henry VIII. as Christ Church, with a fraction of its former endowment).

The Reformation of religion, and the dissolution of the monasteries which it carried with it, destroyed half the glory of Oxford. Two abbeys, five friaries, and five monastic colleges ceased to exist; and the western and south-western quarters, which had contained the finest buildings of the city, became heaps of stones out of which the citizens of Oxford quarried building material. During the Romanist reaction under Queen Mary something was done to repair the loss thus inflicted: Trinity College in 1554 and St John's in 1555 restoring to Oxford Durham College and St Bernard's College. Jesus College, founded nearly twenty years later, in Elizabeth's reign, was the first of Protestant colleges. The more settled times of the early Stuarts patronised the gown more liberally; Wadham College coming in 1613, Pembroke in 1624. Then came the great catastrophe of the Civil War, and learning and the encouragement of learning ceased. The years passed to 1714 before a new foundation arose in Oxford, in Sir Thomas Cookes' Worcester College; and, except for the abortive attempt (1740–1818) to erect Hart Hall into a college, that example found no imitator till our own times, when the foundations of Keble College in 1870 and of Hertford College in 1874, followed

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by the transference to Oxford of Mansfield College and of Manchester New College (though these two colleges are not incorporated in the university), bear witness to the new life which has begun to throb alike in the Anglican Church and in Nonconformity.

In Elizabeth's reign, and still more under the Stuarts, we have to mark a very strong desire on the part of the supreme power to compel all students in the university to reside within the walls of the colleges and the halls (then five in number, now reduced to two). The strong opposition of minorities, in matters both of polity and faith, rendered English sovereigns and their ministers suspicious and intolerant of students and teachers who were not directly under their control; and to secure this control they required that all students should reside in the colleges, where they were under the charge of governors appointed by court influence and responsible to the court. From this time, therefore, we have to date the disappearance of the old university and the development of that peculiarly English form, a university of colleges.

In the following six features the university of Oxford stands in marked contrast to universities out of England. (1) The College System. Before a person becomes a member of the university he must first of all become a member of one of the twenty-one colleges or two halls; and the moment he ceases to be a member of one of these societies his actual membership of the university is also terminated. This means that the Oxford undergraduate is not left as a unit in a great body of two or three thousand, but is made a member of a much smaller body of perhaps eighty to two hundred members, and is therefore subject to closer personal scrutiny and to stronger influences of social opinion than would be possible in universities differently constituted. It is true that the influence of this common life is partially discounted in the case of students from the public schools, where similar influences have already formed their character; but in the case of students from small schools or solitary homes the vigorous social life of a good college is wonderfully efficacious in converting the raw, diffident, or morose boy into the frank, self-reliant, and sociable man. (2) The Fellowship System. Formerly every first-class man (and many in the second class) could count with certainty on his fellowship—that is, on a secure endowment (for a shorter or longer period) which would enable him to pursue his studies or to prepare himself for professional life. Some few of these fellowships are still open to competition; but the regulations of the Commission of 1877, which suppressed many fellowships to found professorships, coinciding with the loss of more than a third of the annual revenues of the colleges from the fall in agricultural rents, have seriously reduced their number and, so far, deprived Oxford of her best feature. The scholarship system—i.e. endowments held during the time of an undergraduate's course, is not so distinctive of Oxford; though such endowments are more numerous and valuable in Oxford than in any other university. (3) The System of Tuition. In foreign universities the work of tuition is undertaken by university teachers—i.e. by the professors. In Oxford the professoriate has withdrawn itself from any real share in this work, and, so far as concerns the mass of Oxford students, might be entirely suppressed without in any way affecting their studies. In all ordinary subjects, speaking generally, the professors have long ceased to give systematic instruction, and have at most expounded some small, and to the ordinary student often unnecessary, point in their subject. It is plain that from two lectures a week, delivered through at most three terms of seven weeks each, a student can learn little in language, in history, in philosophy, or in science. The work of tuition which in other universities is discharged by the professors is in Oxford discharged by the college lecturers. Formerly a college lecturer lectured only to the men of his own college, a system which was terribly unfair to the students of an inefficient college; of late years the better college lectures have become practically open to the whole university, and, especially in lectures connected with the honour schools, frequently without fee. The college lecturers of Oxford are therefore the professors of Oxford, except that they are not called by that name, and that they are paid by their college, not by the university. At the same time, the old Oxford tradition of a college tutor devoting himself to the interests of the men of his own college still continues. Apart from attendance at lectures, a large portion of Oxford tuition consists in taking compositions, translations, papers, and essays either individually or in very small classes to one's tutor or lecturer. This individual instruction involves, it is true, an expenditure of time and talent which seems out of all proportion to the results it achieves, yet the happiest memories of Oxford men are probably those half-hours or hours in their tutor's room when their individual faults were exposed by the large scholarship and their individual eccentricities corrected by the unsparing but good-natured chaff of a kindly mentor. One result of the remarkable improvement in college tuition of the last few years has been the almost total disappearance of the 'private coach' from the honour work of the university. Private coaching continues to a great extent in the pass schools, partly because some candidates have been very badly taught at school and are below the level of their fellows, but chiefly because candidates are too idle to read by themselves. Quite a recent development of the professoriate deserves notice here. When the university has resident in it a man of special reputation in a given branch of study, the common university fund has of late years appointed him to lecture for three or five years in his own subject. In some cases undergraduate Oxford has not seconded this by attendance at these lectures, but the approval of maturer scholars has followed this public recognition of learning. Such lecturers are known by the new title of 'Readers.' (4) The Discipline. The discipline of Oxford is much stricter than that of any university outside England. Within college the government of the college deans, without college the vigilance of the proctors and their deputies, repress disorder and immorality. Sad as is the waste of young lives in Oxford, no one who has known a laxer discipline can refuse to recognise that if a man goes to the bad in Oxford he does it of his own wilful and obstinate choice. (5) At the same time, Oxford must be marked for the excessive luxury and idleness of its students. The common life of the colleges has this disadvantage, that it requires considerable force of character for a poor student to live in proportion to his poverty; there being every inducement for a man of weak character to live after the fashion of his richer and more careless contemporaries. Hence the son of a man of £400 a year often spends during his course at the rate of the son of £4000 a year, and begins his after-life under a heavy burden of debt. And lastly, amusements of different kinds, football, rowing, cricket, tennis, billiards, cardplaying, debating, the theatre, to say nothing of the baser kinds, such as betting, wines, worrying rats and rabbits, are thought of, talked of, and pursued by many undergraduates till barely an hour a day in the eight weeks of term is left for any serious or

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intellectual pursuit. For this devotion to amusements the public schools are largely responsible. (6) The Oxford course is entirely out of touch with the professional education of the country. The Oxford undergraduate, entering the university at nineteen or twenty, finds himself at twenty-three or twenty-four, after the expenditure of £800 or £1000, and the formation of idle habits and expensive tastes, with his whole life to begin afresh. If he wishes to enter the church he has generally to spend some years in a theological college; if he desires to go to the bar he must proceed to the Inns of Court; if he intends to practice medicine the long and expensive training of the London hospital schools has to be gone through.

Scholars and exhibitioners are admitted to a college without special matriculation examination; intending commoners are examined in some form or another by the college tutors. In some colleges it is enough to have passed Responsions, or equivalent examination; in others a further test is imposed; and some few colleges accept candidates in the hope that they will in the course of a term or two pass Responsions. But the practice of colleges varies so much from year to year that personal inquiry about the exact nature of the entrance examination is always advisable and generally necessary.

After admission there opens up a perplexing variety of courses which lead to the degree; but the general rule will be found to hold good, 'avoid any new-fangled course introduced by council, and proceed along the old beaten paths.' Under present arrangements the degree is reached by three examinations: (1) Responsions, familiarly termed 'Smalls.' This is a preliminary examination in the elements of Latin, Greek, and mathematics. It can be passed before coming into residence by means of various school examinations or by presenting one's self as a candidate for matriculation from a college. It *ought* always to be passed before matriculation, except in those cases where the instruction available is so bad that a pass is hopeless under it. (2) After Responsions the candidate has before him the examination which the statutes call the 'First Public Examination,' but men call Moderations ('Mods'), or an equivalent examination. Here it is necessary to decide whether a candidate shall (*a*) take an Honours examination in the middle of his course, (*b*) take a Pass examination at that point, or (*c*) take an examination which implies taking an Honours examination at the end of the course. The decision must be made according to the candidate's attainments, guided by the shrewd advice of his college tutor. In the first case (*a*) there are honours to be had in classics and mathematics (or in both, if the candidate read double) in the course of the second year; in the second case (*b*) a further examination in classics, with the addition of the elements of logic or some further mathematics has to be passed, and this ought to be done in the fourth term of residence; in the third case (*c*) there is what is called a 'preliminary examination' in law or in science giving admission to the final honour schools. All candidates, whether pass or honours, have at this stage to pass an examination in a small portion of Scripture, or an alternative examination provided for those who object to this examination in religion. (3) In the final examinations, officially termed the 'Second Public Examination,' but colloquially 'Greats,' the distinction between pass and honours is very marked. For the pass degree a candidate has to obtain a pass in three schools, of which one must be a language school (classics, French, or German), and the other two may be chosen from divinity, history (ancient or modern), political economy, law, or various branches of natural science. For the honours degree the candidate may choose one or more of the schools of—classics (officially termed 'Literæ Humaniores,' including not only the languages but the history and philosophy of Greece and Rome), mathematics, natural science, law, modern history, theology, oriental languages. Of these the most coveted distinction is the First in 'classical greats,' traditionally the chief Oxford school, for which most scholars and exhibitioners are required to read, and by examination in the subjects of which most of the few open or 'prize' fellowships are awarded.

The traditional 'double first'—i.e. a first-class in classics and mathematics, when there were no moderations and only these two final schools, such as was won by W. E. Gladstone in 1831 and by Dean Liddell in 1833—is now forgotten; and as many as three, four, or even five firsts are obtained without bringing the successful candidate much reputation in the university, or even a fellowship.

Candidates entering for an honour school and failing to get honours may be either 'ploughed'—i.e. rejected entirely—or 'gulfed'—i.e. allowed a stage in the pass degree. If a candidate in any school despairs of his chances, he can 'scratch'—i.e. remove his name from the list of candidates. In many of the schools, both pass and honours, there is a *viva voce* examination as well as a written examination. In the final honour schools candidates who have broken down in health may obtain an 'ægrotat' certificate allowing them to proceed to their degree. Four such certificates were allowed in 1890.

The following list, compiled from the honours lists of 1890, exhibits the distribution of candidates among the honour schools and between the four classes in each school:

GREATS.

	Class I.	Class II.	Class III.	Class IV.	Total.
Classics	22	48	41	13	124
Mathematics	9	5	6	3	23
Chemistry	6	7	4	..	17
Morphology	2	1	..	..	3
Physics	...	2	..	..	2
Geology	..	1	..	..	1
Botany	..	..	1	..	1
Physiology	..	..	2	..	2
Law	3	16	25	8	52
Modern History	6	32	38	10	86
Theology	4	14	28	12	58
Oriental	..	3	..	..	3

MODERATIONS.

Classics	50	93	82	..	225
Mathematics	7	12	7	..	26

A comparison of the above table with the list of professors, lecturers, and demonstrators yields the ridiculous result that to produce twenty-six candidates graduating in honours in science the university employs a staff of twenty-seven teachers, and that these require the assistance of several college lecturers.

The number of persons who graduated B.A. in the academical year 1889–90 was 597. The degree of M.A. is obtained by keeping the name on the books for three (or four) years from the date of B.A., by paying quarterly dues, and by paying graduation fees. The number of M.A.'s taken in 1889–90 was 421. The university of Oxford grants also the degrees of bachelor and doctor in divinity, law, medicine, and music. The exercises for degrees in divinity are merely formal, but the fees paid for these degrees are considerable. The bachelors' degrees in law, medicine, and music are awarded after examinations which have been brought up to the standard of those professions, but for the most part candidates study for them outside the university. The doctors' degrees in the same faculties are now awarded, as in other

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universities, on the production of approved theses. In the academical year 1889–90 the following persons graduated: In divinity, B.D. 13, D.D. 7; in law, B.C.L. 11, D.C.L. 2; in medicine, M.B. 9, M.D. 1; in music, B. Mus. 7, D. Mus. 1.

The university, on the initiative of the Hebdomadal Council, from time to time confers *honoris causâ* the degrees of M.A., D.C.L., and D.D., the latter by custom being always voted to members of the university who have been raised to the episcopal bench. The number of these 'honorary degrees' in the academical year 1889–90 was as follows: Hon. M.A. 1; Hon. D.C.L. 7; Hon. D.D. 5.

All ordinary degrees require that candidates should have kept a specified number of terms by having their names on the books of some college or hall or of the non-collegiate students. For the degree of B.A. it is further required that the candidate should have resided in Oxford during twelve terms. In the academical year there are four terms—Michaelmas term (October to December), Hilary or Lent term (January to March), Easter and Trinity terms (the latter beginning the day after the former closes, April to July). The first two are kept by six weeks' residence, the last two by three weeks' residence in each, the legal requirements of residence being thus eighteen weeks in the year. The colleges, however, under ordinary circumstances, require an undergraduate to reside eight full weeks in each term (counting Easter and Trinity as one term)—i.e. twenty-four weeks in the year.

The number of undergraduates is now much too large to be accommodated within the walls of the colleges, and most colleges have undergraduates residing outside the college in lodgings in the town. They are still, however, strictly under the control of the university and the college. (1) No undergraduate is allowed to lodge in a house nor with a landlord who has not been licensed by the university, a provision which partially guards against unsanitary lodgings and overt scandalous conduct, but immensely increases the expense of lodgings; (2) if the undergraduate goes out or comes in after 10 P.M. the fact is supposed to be noted in the 'gate bill' which the landlord has to send weekly to the college. In October 1890 there were residing in lodgings 637 undergraduate members of the colleges and halls and 211 non-collegiate students.

Since 1868 there has been in Oxford a body of students not members of any college or hall, styled formerly 'unattached students,' but latterly 'non-collegiate students.' These reside in licensed lodgings; have a building provided by the university in which they attend lectures and meet their tutors; are under the disciplinary control of a censor, as the students of a college are under the control of their dean; and are supervised by a board of delegates, in the same way as the students of a college are by the head and fellows of their college. Under a statute of 1882 it is possible for a member of convocation to open a 'a private hall,' of which he is the 'licensed master,' for the reception of academical students. These private halls act chiefly as a limbo to which, in preference to leaving the university altogether, students who have been rejected by or ejected from the colleges betake themselves.

The number and disposition of the fellows and undergraduate members of the university in 1891 are shown in the following table:

	Date of Foundation.	Title of Head.	No. of Fellows.	No. of Scholars.	No. of Exhibitioners &c.	No. of Commoners.
University College (Univ.)	? 1249	Master.	13	17	14	70
St Edmund Hall	? 1260	Principal.	..	..	..	35
Balliol College	? 1268	Master.	18	27	32	130
Merton College	1274	Warden.	20	18	10	94
Exeter College	1314	Rector.	9	26	12	104
Oriel College	1326	Provost.	14	16	6	68
St Mary Hall	1333	Principal.	..	..	1	22
Queen's College	1340	Provost.	14	34	38	48
New College	1379	Warden.	24	33	13	185
Lincoln College	1429	Rector.	10	18	12	57
All Souls College	1437	Warden.	35	..	4	1
Magdalen College	1458	President.	24	30	16	119
Brasenose College (B.N.C.)	1509	Principal.	13	26	20	75
Corpus Christi College (C.C.C.)	1516	President.	12	27	7	46
Christ Church (Ch. Ch.)	1546	Dean.	28	45	45	181
Trinity College	1554	President.	11	20	15	129
St John's College	1555	President.	16	26	8	68
Jesus College	1571	Principal.	10	19	2	62
Wadham College	1613	Warden.	8	18	13	68
Pembroke College	1624	Master.	8	26	..	35
Worcester College	1714	Provost.	9	16	10	79
Non-collegiate Students	1868	Censor.	..	..	..	225
Keble College	1870	Warden.	..	13	6	160
Hertford College	1874	Principal.	18	39	9	44
Charley's (Private) Hall	..	Licensed Master.	..	..	..	21
Turrell's (Private) Hall	..	Licensed Master.	..	..	..	8
			309	494	298	2144

In this table it must be noted that in the column of commoners none are reckoned who matriculated before 1886, and that to ascertain the number of commoners in actual residence about five per cent. must be struck off the numbers given. At Merton College the scholars are called 'postmasters,' at Magdalen College, 'demies.' At Christ Church the fellows are called 'students,' and until 1877 the scholars were called 'junior students.' Christ Church, being a cathedral as well as a college, has also an ecclesiastical foundation of six canons.

Oxford is fortunate in having been described from the points of view of its different interests in several attractive handbooks: Rev. C. W. Boase's *Oxford City*, in the 'Historic Towns' series (Longmans, 1887); Dr Brodrick's *History of the University of Oxford*, in the 'Epochs of Church History' series (Longmans, 1886); Rev. E. Marshall's *Oxford Diocese*, in the 'Diocesan Histories' series (S.P.C.K. 1882); and *The Colleges of Oxford: their History and Traditions*, edited by A. Clark (Methuen, 1891). Messrs Parker's *Handbook for Oxford* is an admirable guide to the architectural features of the city; and in Andrew Lang's *Oxford: Brief Historical and Descriptive Notes* (1885; new ed. 1890) a charming presentment of Oxford is given both by writer and artists. A manual of the studies of the university is furnished by J. Wells in his *Oxford and Oxford Life* (Methuen). A full account of Oxford, civic, ecclesiastical, academic, collegiate, personal, up to the end of 17th century, will be found in the various works of the great Oxford antiquary, Anthony Wood, in the following editions—his *History of the University* and of the *Colleges and Halls*, by J. Gutch (1786–96); his *Athenæ* and *Fasti*, by Dr Bliss (1813–20; a new edition of these is in preparation); his *City of Oxford*, by A. Clark (1889 *seqq.*). From the time of Wood the formal annals of the university become of little interest and very little importance. The interest of books about Oxford rather lies in the diaries which

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give the day-to-day impressions of Oxford residents, Anthony Wood for the 17th century and Thomas Hearne for the 18th (best edition of both by the Oxford Historical Society), or in reminiscences of Oxford life in memoirs and autobiographies—e.g. in the autobiographies of Edmund Gibbon, R. L. Edgeworth, &c., and in Stanley's *Life of Arnold*. Part of the ground traversed by Wood has been gone over from the point of view of modern criticism by James Parker for the city (to the year 1100) in his *Early History of Oxford* (Oxf. Hist. Soc. 1888), and by H. C. Maxwell Lyte for the university (to the year 1530) in his *History of the University of Oxford* (Macmillan, 1886).

Periodical publications are—for the city, Valter's *Oxford Post-office Directory* and Alden's *Oxford Almanac*; for the university, *Oxford University Calendar*, *Student's Guide to the University*, *Regulations of the Boards of Studies*, and (weekly during term) *University Gazette*; for the diocese, Parker's *Oxford Diocesan Calendar* and (monthly) Parker's *Oxford Diocesan Gazette*. The local press is exceptionally vigorous, the weekly penny papers being *Oxford Chronicle* (Liberal), *Oxford Times* (Conservative), *Jackson's Oxford Journal* (established 1753), *Oxford Guardian*. The *Oxford University Herald* is a weekly paper (2d.); the *Oxford Review*, daily during term, a halfpenny evening paper; and the *Oxford Magazine*, weekly during term, 6d., the most established of university journalistic ventures.

Oxford, EARL OF. See HARLEY.

Oxford Clay, the principal member of the Middle Oolite series. See JURASSIC SYSTEM.

Oxford Movement. See ENGLAND (CHURCH OF), and KEBLE, NEWMAN, PUSEY.

Oxfordshire, an inland county of England, in shape very irregular, and with an extreme length and breadth of 48 miles by 26; is bounded on the N. by Warwickshire and Northants, E. by Bucks, S. by the river Thames, and W. by Gloucestershire. Area, 755 sq. m., or 483,621 acres. Pop. (1801) 109,620; (1881) 179,559; (1891) 185,938. Flat and bleak in the north and west, except near Edgehill (q.v.), on the Warwickshire border, and undulating in the central district, the county in the south presents a succession of richly wooded hills, alternating with picturesque dales, and terminating on the south-east border with a branch of the Chiltern Hills, which, near Nuffield, attain a height of nearly 700 feet above the sea-level. Foremost, however, among the natural beauties of Oxfordshire are the numerous rivers by which it is watered, notably the Thames, with its affluents the Windrush, Evenlode, Cherwell, and Thame. The Oxford and Birmingham Canal affords access to the midland coalfields. The soil in general is fertile, and the state of agriculture advanced, as evidenced by the fact that in 1889, exclusive of 2061 acres under cultivation as orchards and market-gardens, no less than 414,192 acres were under crops, fallow, or grass. Ironstone is extensively worked near Banbury, whilst of manufactures the most important are those of blankets at Witney, paper at Shiplake and Henley, and, to a certain extent, of gloves at Woodstock. The county contains fourteen hundreds, the municipal boroughs of Banbury, Chipping Norton, Henley-on-Thames, and Woodstock, and parts of those of the city and university of Oxford, and of Abingdon (the remainder being in Berkshire), and 292 civil parishes, all in the diocese of Oxford. Three members are returned to the House of Commons for the county, as also one for the city of Oxford and two for the university; the county council numbers seventy-six members. Most of the historical events connected with the county took place at Oxford (q.v.), but apart from them may be mentioned the battles of Chalgrove (1643) and Cropredy Bridge (1644). The best known of its worthies are Edward the Confessor, Leland (the antiquary), Dr Heylin, Viscount Falkland, 'Doctor' Fell, Thomas Ellwood, Lord Chief-justice Holt, Rev. James Granger, Warren Hastings, Lord Keeper Guilford, Sir William Beechey, Miss Edgeworth, Charles Reade, Green (the historian), Lord Penzance, Sir William Vernon Harcourt, and Lord Randolph Churchill. See works by Skelton (1823) and Davenport (1869).

Oxidation is the term applied in chemistry, with a somewhat wide significance, to the changes which occur when elementary or compound substances enter into new combinations with oxygen. The majority of those chemical actions to which the term Combustion (q.v.) is applied are examples of oxidation. The products of the processes of oxidation are frequently (but not invariably) oxides.

Oxides are compounds of oxygen with other elements, and are amongst the most important of the classes of chemical compounds. Basic oxides and acid oxides are described in the article CHEMISTRY (q.v.). In addition to these two large classes of oxides there are numerous oxides which do not possess either basic or acid properties, or if at all only to a very insignificant degree.

Oxlip. See COWSLIP.

Ox-pecker. See BEEF-EATER.

Oxus, the ancient name of a river in western Asia, which is called by Arab writers Jihûn, and by the Asiatics of the regions through which it flows Amû or Amû-Daria. It rises in the elevated tablelands between the Tian-Shan Mountains and the Hindu-Kush, and flows west as far as 66° E. long. through Badakshan, and then north-west through Bokhara and Khiva, and empties itself by several mouths into the southern end of the Sea of Aral. There are two main head-streams issuing at 13,042 and 14,177 feet respectively, and uniting in 71° 20′ E. long. at 7500 feet. In the first part of its course the volume of the Oxus is increased by numerous affluents, but it receives few tributaries after it turns north-west, its course then running through the deserts of Turkestan. The delta is 90 miles long, and embraces many lakes and marshes. The principal use made of the river is for irrigation purposes; Khiva owes its prosperity entirely to its waters. The river has been ascended for 280 miles by steamboats. It is believed that before the Christian era the Oxus flowed into the Caspian, and that since about 600 A.D. it has twice changed its course. The Russians have been considering the possibility of turning it back again into the Caspian. The physical conditions seem to be favourable, and if the plan were carried out Russia would get a navigable highway a couple of hundred miles farther towards the centre of Asia. For the great railway bridge across the river (1888), see BRIDGE, Vol. II. p. 444; and see works by J. Wood (1841; new ed. by Colonel Yule, 1872) and MacGahan (1876).

Oxyazo. See DYEING, Vol. IV. p. 142.

Oxychlorides, chemical compounds containing both chlorine and oxygen in combination with some other element, and intermediate in composition between the oxides on the one hand and the chlorides on the other. Thus, antimonious oxychloride, SbOCl, is intermediate between antimonious oxide, Sb_2O_3, and antimonious chloride, $SbCl_3$.

Oxygen (sym. O, atom. wt. 16) is a colourless, inodorous, tasteless gas, long regarded as a 'permanent' gas, but liquefied by Pictet of Geneva for the first time in 1877. Its chemical affinities for other elementary substances are very powerful; with most of them it is found in combination, or may be made to combine, in more than one proportion; with several in as many as four different proportions; and there is only one element (fluorine) with which it does not enter into any combination.

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Owing to the intensity with which many of these combinations take place, this gas has the power of supporting Combustion (q.v.) in an eminent degree. It is only slightly soluble in water; 100 cubic inches of that liquid dissolving 4·11 cubic inches of gas at 32°, and only 2·99 inches at 59°. It is slightly heavier than air, its specific gravity being 1·1056.

Oxygen gas is not only respirable, but is essential to the support of animal life; and hence it was termed *vital air* by some of the older chemists. A small animal placed in a bell-glass containing pure oxygen will not be suffocated as soon as if it were placed in the same glass filled with atmospheric air. For further details on this property of oxygen, the reader is referred to the article RESPIRATION.

Oxygen is the most abundant and the most widely distributed of all the elements. In its free state (*mixed* but not *combined* with nitrogen) it constitutes about a fifth of the bulk, and considerably more than a fifth of the weight, of the atmosphere. In combination with hydrogen, it forms eight-ninths of all the water on the globe; and in combination with silicon, calcium, aluminium, &c., it enters largely into all the solid constituents of the earth's crust; silica—in its various forms of sand, common quartz, flint, &c.—chalk, limestone, marble, and all the varieties of clay, containing about half their weight of oxygen. It is, moreover, found in the tissues and fluids of all forms of animal and vegetable life, none of which can support existence independently of this element.

There are various laboratory methods of obtaining oxygen on the small scale, the simplest of which consists in the exposure of certain metallic oxides to a high temperature. It was originally obtained by its discoverer, Dr Priestley, from the red oxide of mercury, which, when heated to about 750°, resolves itself into metallic mercury and oxygen gas. It may be obtained similarly from red oxide and peroxide of lead, the resulting products being protoxide of lead and oxygen.

The ordinary laboratory method commonly employed to obtain an abundant supply of oxygen consists in heating chlorate of potash, $KClO_3$, which yields up all its oxygen (amounting to 39·16 per cent.), and leaves a residue of chloride of potassium. One ounce of this salt yields nearly two gallons of oxygen gas. It is found by experiment that if the chlorate of potash is mixed with about a fourth of its weight of black oxide of copper, or of binoxide of manganese, the evolution of the gas is greatly facilitated, although the oxides do not seem to undergo any change during the process.

Various processes have been proposed for obtaining oxygen on the large scale, but only in recent years has the commercial production of the gas been carried out sufficiently cheaply to enable oxygen to be employed extensively for industrial purposes. The method employed by Brin's Oxygen Company consists in passing air under pressure over barium oxide, BaO, heated to a temperature of dull redness. In this way a quantity of barium peroxide, BaO_2, is formed, and this can be made to again yield up its extra oxygen in the pure state (being reduced again to BaO) by heating to a full red heat, or, as is actually done in practice, by greatly diminishing the gaseous pressure without altering the temperature. It is estimated that oxygen can be produced by this process at a cost of from 5s. to 7s. 6d. per 1000 cubic feet. Oxygen can now be obtained in practically any required quantity in wrought-steel cylinders, in which it is compressed up to a pressure of 120 atmospheres.

Of the compounds of oxygen it is unnecessary to speak here, as they are described in the articles on the other chemical elements.

Oxygen was discovered almost simultaneously, in the year 1774, by Priestley and by Scheele, the English chemist having the precedence by a few weeks. Priestley gave it the name of *Dephlogisticated Air*; Scheele termed it *Empyreal Air*; Condorcet shortly afterwards suggested *Vital Air*, as its most appropriate designation; and in 1789 Lavoisier, who, by a series of carefully conducted and very ingenious experiments, proved that the combustion of bodies in the air consisted essentially in their chemical combination with oxygen, and thus overthrew the *Phlogiston* (q.v.) theory, gave it the name which it now retains (from *oxys*, 'acid,' and *gennaō*, 'I produce'), in consequence of his (erroneously) believing that it was a necessary constituent of every acid.

Oxyhydrogen. See LIME-LIGHT.

Oyer and Terminer (Fr. *ouïr*, 'to hear;' *terminer*, 'to determine'). See ASSIZE.

Oyster (*Ostrea*), a genus of bivalves, the members of which are well known to be very passive and very palatable. *Structure.*—The fundamental characteristics, as displayed by the favourite European species, *Ostrea edulis*, are those of other bivalve Molluscs (q.v.), but the 'foot,' with which many less sedentary forms move, is almost completely degenerate, the two valves of the shell are unequal, the hinge which unites them is without teeth, and

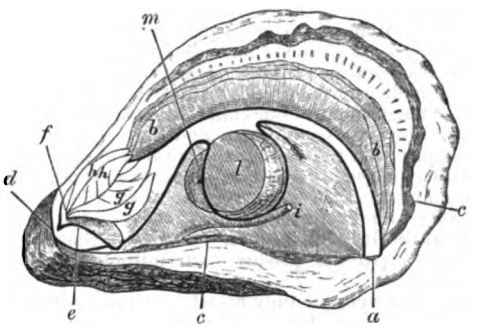

Diagram of Internal Structure.

The dorsal surface is downwards, the anterior or head end to the left. *a*, region where water enters and leaves the animal; the dark lines indicate where one mantle-flap has been cut away to expose the other structures; *b*, gills; *c*, margin of one of the mantle-folds; *d*, anterior part of hinge; *e*, hood over mouth; *f*, position of mouth; *g*, *h*, labial palps; *i*, end of intestine; *l*, the closing muscle of the shell; *m*, position of the heart.

the powerful closing muscle is almost median in position. The left valve of the shell, that by which the animal fixes itself, is hollowed out, while the other is almost flat, and the whole animal is slightly unsymmetrical. On an opened oyster it is easy to detect the fringed mantle which lines and makes the shell, the ciliated gills or 'beard,' two somewhat similar flaps (labial palps) on each side of the mouth, which, overhung by a hood, lies near one end of the hinge, the brownish digestive gland, the heart and the kidneys close beside the shell-shutting muscle. 'I suppose,' says Professor Huxley, 'that when the sapid and slippery morsel—which is and is gone like a flash of gustatory summer lightning—glides along the palate, few people imagine that they are swallowing a piece of machinery (and going machinery too) greatly more complicated than a watch'—in fact a living organism of a high order.

General Life.—The oyster feeds on microscopic organisms which are washed into the gaping shell and on to the mouth by the ciliary activity of the gills and palps; and it may be noted that the greenish tinge, regarded by epicures as one of the highest credentials of an oyster, is probably due to a copious diet of minute green algæ. As every one knows, oysters live gregariously in 'beds' or

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'banks' at depths of 3 to 20 fathoms, and are strangely fastidious as to locality. They have many enemies besides the dredger, such as the little sponges (Clione), which bore in the shells; marine worms, and sea-snails (e.g. Purpura and Murex), which also effect an entrance; besides starfishes, which swallow little ones intact, or, embracing larger specimens, insert their arms when the shells gape. Although these passive animals have no eyes or ears they can detect the shadow of an approaching boat; the mantle-fringe and some other parts are undoubtedly sensitive; and some enthusiasts have even inferred 'intelligence' from the fact that in the 'oyster-schools' and elsewhere the molluscs learn to keep their shells shut when the tide retires or when they are transported by rail!

Life-history—There are many interesting facts connected with the life-history of the oyster. Thus, *O. edulis* is hermaphrodite, being first an egg-laying female, afterwards a sperm-producing male, while *O. angulata* and the American *O. virginica* have the sexes separate. Maturity is sometimes rapidly attained, but usually not until the third or fourth year of life, and the maximum fertility is between the fourth and seventh year. The reproductive season generally begins in May, and continues till the beginning of autumn, but its limits are extended or lessened by the conditions of temperature. When the oyster becomes 'sick,' 'milky,' or 'out of season,' the mantle-cavity and the interspaces between the gills are packed with developing eggs, which fishermen call 'white,' and at a later stage 'black spat.' Buckland likened this black spat to fine slate-pencil dust, and the emergence of the young from the mother to a puff of smoke from a railway-engine. He computed the number of developing eggs in an oyster at from 276,000 to 829,000; and Professor Möbius, the greatest German authority on oysters, calculates that 1000 full-grown parents produce 440 million embryos annually.

These embryos are only about $\frac{1}{110}$th of an inch in length, and about two millions of them might be packed into a cubic inch, but the numbers which rise from an oyster-bank are so immense that the water seems to be clouded. They are very unlike the adults in habit, for they swim actively for some days by means of a protrusible ciliated cushion or *velum*. The valves of the shell are transparent and symmetrical; the gills, palps, and some other adult structures have yet to be developed. In the American oyster, the eggs are set adrift at an early stage, fertilisation and the whole of development taking place outside the shelter of the parent. In either case the mortality is enormous; multitudes are washed away to unsuitable localities, and multitudes are devoured by hungry animals; in fact Möbius computes that out of 440 million embryos only 421 individuals reach maturity.

Those that survive become weighted by their growing shells, draw in their ciliated velum for the last time, and sink to the bottom as a 'fall of spat.' They settle on stones, shells, or other 'culch,' and often nowadays on chalked tiles or on floating collectors which are placed for the purpose of receiving them. Moored by their left shells, they grow rapidly, from $\frac{1}{10}$th of an inch when first attached, till at the end of six to eight months they are like threepenny pieces, and are known as 'brood.' 'The diameter of an oyster at two years is about two inches, another inch is added in the third year, after which the growth is much less rapid.'

Different Kinds.—Oysters are represented by several widely distributed species—e.g. the European *O. edulis* and *O. angulata*, the American *O. virginica* with several varieties, two others from the western coasts (*O. conchophila* and *O. lurida*)—all of them edible, while the Cape of Good Hope, Australia, Japan, &c. are not without their share. They vary considerably in size; those from 3 to 6 inches are common, but Sir J. E. Tennent found one in Ceylon measuring a little over 11 inches in length. American oysters are often very large. The banks of oysters sometimes form important marine and shore deposits—witness the banks of long, narrow 'raccoon' oysters off the coast of Georgia and other parts of North America, which are said to form natural breakwaters. The race is an ancient one, for oysters appear in the Carboniferous strata, and two related forms—Gryphæa and Exogyra—with thick heavy shells, are common fossils. The name is sometimes extended to other bivalves, such as the false oyster Anomia (one valve of which is perforated by a tag of attaching byssus), the pearl-oyster Meleagrina (see PEARL), and the thorny oyster Spondylus.

Edibility.—The accumulations of oyster-shells in the 'kitchen-middens' of Neolithic ages show that the appreciation of oysters is no modern taste. To Roman palates the oyster was precious, and the praises of its appetising flavour (*grata ingluvies*) were often sounded. Those of Rutupiæ (Richborough, in Kent) were early known to the epicures and highly esteemed. When eaten alive or half-alive in the usual fashion, they are not only pleasant, but nutritious and readily digested, nor can any evil effects (such as parasites) be traced to moderate indulgence in these dainties. 'The points of an oyster are,' Frank Buckland says, 'first the shape, which to be perfect should resemble very much the petal of a rose-leaf. Next, the thickness of the shell; a first-class thoroughbred native should have a shell of the tenuity of thin china or a Japanese tea-cup. It should also have an almost metallic ring, and a peculiar opalescent lustre on the inner side; the hollow for the animal of the oyster should be as much like an egg-cup as possible. Lastly, the flesh itself should be white and firm, and nut-like in taste. It is by taking the average proportion of meat to shell that oysters should be critically judged. The oysters at the head of the list are of course "natives" (oysters artificially reared); the proportion of a well-fed native is one-fourth meat. The nearest approach to natives, both in beauty and fatness, are the oysters of Milford in South Wales. The deep-sea oysters, such as the white-faced things dredged up in the Channel between England and France, are one-tenth meat; while the very worst are some Frenchmen, which are as thin and meagre as French pigs.'

Demand.—Of the enormous consumption of oysters a few statistical illustrations may be interesting. Thus, it was estimated some years ago that 500 millions were sold annually in London, at a cost of £100,000; but the supply has somewhat decreased, and the price per hundred correspondingly increased. The total British expenditure in oysters has since been calculated at £2,000,000, for about 240 million oysters at twopence each. In Paris the annual consumption is said to be over 100 millions, which cost, it is said, 1,654,359 francs in 1853, 2,186,000 in 1859, and 4,260,000 in 1888. According to the United States census of 1880, the business gives employment to over 52,000 persons and over 4000 vessels, and involves an investment of over $10,500,000. More than 22 million bushels are produced, and these sell for nearly $13,500,000. The industry has developed enormously within recent years: in New York state alone the capital invested now exceeds $6,000,000. Oysters are sent from Baltimore, New York, and other principal markets in carloads to the west—to Milwaukee, Chicago, St Louis, and even San Francisco. The great beds occur in Long Island Sound and Chesapeake Bay;

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the former is in part surveyed and divided into plots, not to exceed 500 acres for any one person, for oyster-culture. The bivalve is found, however, from the Gulf of St Lawrence to and along the north shore of the Gulf of Mexico, and, though smaller, at points on the west coast, as Puget Sound and Juan de Fuca Strait. In some parts of the United States the Clam (q.v.) rivals the oyster in popularity.

Supply.—The British supply is derived from three sources—from the national oyster-banks, which are gradually getting the attention which they deserve; from the continental banks and farms, especially those of France and Holland; and from the United States, with which a trade amounting to about half a million dollars annually has rapidly grown. Moreover, it must be noted that young oysters are largely imported from France and elsewhere to be 'fattened' on British culture-grounds. The practical problem is to keep up a supply sufficient to meet the large demand. For various reasons this seems to be difficult. As oysters live in 3 to 20 fathoms of water, they can hardly be gathered with much selection; they are sometimes lifted by 'rakes' and tongs, but usually by the dredge; this is a destructive process, probably killing more than it secures. There seems some evidence to show that sheer over-dredging has almost ruined some of the banks, but this probably has been exaggerated. Changes in the sea-bottom and in the food-supply have doubtless had more to do with the disappearance of oysters from localities where they once abounded. Those who permit all kinds of debris and foulness to be emptied into the sea can hardly expect a flourishing oyster-bank in the neighbourhood. To preserve the beds, to observe 'close time,' to re-stock when the supply wanes, and similar practical precautions are certainly effective; but regulations which are satisfactory on paper are often very unsatisfactorily realised. The reader should consult the Parliamentary Reports on *British Oyster Fisheries* (1870), and on the increasing scarcity (1876).

Oyster-culture.—Another practical endeavour which has been richly rewarded is that of artificial oyster-culture. This is of course no novelty, having been practised by the Romans. Thus, Pliny says that 'the first person who formed artificial oyster-beds was Sergius Orata (in the time of Augustus), who established them at Baiæ . . . not for the gratification of gluttony, but for the sake of gain, as he contrived to make a large income by the exercise of his ingenuity.' In the days of the later emperors there were well-established *ostrearia*, and Lake Fusaro, the Acheron of Virgil, a muddy salt-water pond, nowhere more than six feet in depth, has been for many centuries utilised for this purpose. Of oyster-culture there are many different kinds; it may be confined to 'fattening' oysters in some conveniently constructed pond; or 'fallen spat,' collected on tiles or artificial 'culch,' may be brought to the sheltered culture-grounds, where the young can grow in safety; or again, oysters may be bred in confinement, as Professor J. A. Ryder has succeeded in doing in America. In this last case the oysters were kept in a pond separated from the sea by a sandbank, through which water alone came and went with the tide; they produced eggs, these grew into 'spat,' the young fell on suitable collectors, which were afterwards removed to the natural beds. It has even been found possible to fertilise the eggs artificially with sperm from male oysters, and though this is not so feasible in the case of the European species, whose eggs are retained within the parent until they have to some extent developed, there is no theoretical obstacle against breeding them in confinement. Another possibility is to collect the free larvæ, which are sometimes very abundant, and transfer them to culture-grounds where the risks of mortality would be lessened. The success which has already attended various forms of oyster-culture, of which details will be found in the reports cited below, certainly warrants further extension and experiment, especially as many authorities believe that there is more hope in this than in any legislative measures to preserve the natural banks. Arcachon (q.v.) and Cancale are important French seats of oyster-culture; in England Whitstable is most notable. The frost of the winter of 1890–91 was estimated to have done £15,000 of damage to the oysters of two companies at Whitstable.

See Parliamentary Reports on *Oyster Fisheries* (1870, 1876, 1878); Report of the United States Fisheries Commission, viii., which contains not only the results of American observations and experiments, but translations of valuable memoirs by Hoek, Hubrecht, and Möbius; Report of Scotch Fisheries Board (J. H. Fullarton on *Oyster-culture in France, &c.*), 1890; Möbius, *Die Auster und die Austernwirtschaft* (1877); E. Ingersoll, *The Oyster Industries of the United States* (1881); W. K. Brooks, *Development and Protection of the Oyster in Maryland* (1884), and *Studies from Biol. Lab.* (vol. i. 1880); Huxley, in *English Illust. Mag.* (vol. i. 1883); Marquis of Lorne, in *Good Words* (1890); Philpot, *Oysters and all about them* (1890).

Oyster-catcher (*Hæmatopus*), a genus of birds of the family Charadriidæ, closely allied to the Plovers, and distinguished chiefly by the long, strong, straight, wedge-shaped bill, legs of moderate length, feet with only three toes, all directed forwards and united at their base by a small membrane. The genus, which is cosmopolitan in its distribution, embraces nine species. The only European species, *H. ostralegus*, known also as the Sea-pie and Mussel-picker, is found on many parts of the English coast, and is common in Scotland along the whole east coast, on the adjacent islands even as far as St Kilda, and also on the Irish coasts. Although a coast bird, it often wanders inland, and may be found breeding near inland lochs and on the banks of large rivers. It occurs in Greenland, is common in Iceland, and in many parts of Europe, Asia, and Africa. Its southern

Oyster-catcher (*Hæmatopus ostralegus*).

migrations extend to Burma, Ceylon, Persia, Mozambique, and Senegambia. The adult bird is about 16 inches long, has black and white plumage, orange-yellow bill, crimson irides, and flesh-coloured legs and toes. It is very regular in its feeding habits, passing with great punctuality to and from its feeding-grounds, where it regales itself with mussels, whelks, limpets, annelids, crustaceans, and small fish. Its eggs, usually three or four in number, are laid on shingle, more rarely among sandhills or even in fields inland, and sometimes on the top of a fairly lofty stack. The oyster-catcher swims well, and takes to the

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water of its own accord. Its flesh, though dark in colour, is palatable. *H. capensis* is a black species ranging from the Cape to the Canaries. Three or four species are confined to America.

Oyster Plant. See SALSIFY.

Ozæna (Gr. *ozē*, 'a stench') is generally used of all diseased conditions of the nose accompanied by great fetor of the breath. This may arise from the ulcerations occurring in tubercular or syphilitic disease, or in lupus; from malignant disease; from necrosed bone; or from the presence of a foreign body. But it also occurs where none of these causes is present; and to this form of disease the term is limited by some recent writers (Fränkel, Morell Mackenzie, and others). In these cases there is a peculiar form of inflammation of the mucous membrane of the nose, called *dry catarrh*, in which the morbid secretion accumulates in the form of crusts in the nasal cavity. This may occasion comparatively little inconvenience, till it leads, as it often does, to the occurrence of an offensive and characteristic odour, the precise cause of which has not been ascertained. It is a very chronic and troublesome disease; but much relief is obtained by the frequent use of alkaline and antiseptic washes or sprays. An arrangement devised by Gottstein renders the secretion moist, and so keeps the fetor in abeyance—the introduction of a plug of cotton-wool, which is worn in each nostril for a few hours daily.

Ozanam, ANTOINE FRÉDÉRIC, was born at Milan, April 23, 1813, studied at Lyons and Paris, and was appointed in 1841 to fill the chair of Foreign Literature at the Sorbonne. He died at Marseilles, September 8, 1853. Ozanam possessed learning and industry, but fate did not favour him in his dream of rivalling the work of Gibbon, save in such fragments as *Dante et la Philosophie Catholique au XIII^e^ Siècle* (1839), *Histoire de la Civilisation au V^e^ Siècle* (1845; Eng. trans. 1868), and *Études Germaniques* (1847–49). A collected edition of his writings fills 11 vols. (1862–75). There are Lives by Karker (Paderborn, 1867), O'Meara (Edin. 1876), and Hardy (Mainz, 1878).

Ozokerite. See BITUMEN.

Ozone (Gr. *ozō*, 'I smell'). It was remarked long ago that a peculiar odour was produced by the working of an electrical machine. Van Marum found that, when electric sparks were passed through a tube containing oxygen, the gas became powerfully impregnated with this odour—which he therefore called the 'smell of electricity.' Subsequent writers attributed the phenomenon to the formation of nitric acid, due to a trace of nitrogen mixed with the oxygen; especially as the gas was found to act energetically upon mercury. Thus supposed to be explained, these curious results were soon forgotten. But in 1840 Schönbein (q.v.) with remarkable acuteness made a closer investigation of the question, and arrived at many most curious results, all of which have not even yet been satisfactorily accounted for. The problem remains, in fact, one of the most perplexing, as well as interesting, questions imperfectly resolved in chemistry. The earlier results of Schönbein were these: (1) When water is decomposed by the voltaic current, the electrodes being of gold or platinum, the oxygen (which appears at the positive pole) possesses in a high degree the smell and the oxidising power developed by Van Marum by means of friction-electricity. (2) When the positive electrode is formed of an oxidisable metal these results are not observed, but the electrode is rapidly oxidised. (3) The oxygen collected at a platinum electrode retains these properties for an indefinite period if kept in a closed vessel; but loses them by heating, by the contact of an oxidisable substance, and even by contact with such bodies as charcoal and oxide of manganese. To the substance, whatever it may be, which possesses such powerful chemical affinities, Schönbein gave the name ozone, from its smell. In 1845 he showed that the same substance can be produced by the action of phosphorus on moist air, and hinted that it might be a higher oxide of hydrogen.

De la Rive and Marignac shortly afterwards, repeating the experiments of Van Marum, showed that electric sparks produce ozone even in *pure* and *dry* oxygen, and came to the conclusion that ozone is oxygen in an *allotropic* state, as diamond is a form of coke or charcoal. Baumert, in 1853, endeavoured to show that there are two kinds of ozone—one formed from pure oxygen by electric sparks, which he allowed to be allotropic oxygen; the other formed in the voltaic decomposition of water, which he endeavoured to prove to be a *teroxide* of hydrogen. Andrews, in 1856, refuted this view, by showing that no such oxide of hydrogen (at least in a gaseous form) is produced in the electrolysis of water; and that ozone, from whatever source obtained, is the same body, and is not a compound, but an allotropic form of oxygen.

In 1860 Andrews and Tait published the results of a series of *volumetric* experiments on this subject, which led to some remarkable conclusions—among which are the following: When the electric discharge is passed through pure oxygen it *contracts*, hence ozone must be denser than oxygen. A much greater amount of contraction, and a correspondingly greater quantity of ozone, are produced by a silent discharge of electricity between fine points than by a brilliant series of sparks. The contraction due to the formation of the ozone is entirely removed by the destruction of the ozone by heat; and this process can be repeated indefinitely on the same portion of oxygen.

Soret subsequently determined the density of ozone as compared with that of oxygen, first by absorbing the ozone from the oxygen with which it was mixed by means of oil of turpentine or oil of cinnamon, and observing the contraction produced; and later by determining the relative rates of diffusion of chlorine and ozone. He ascertained that its density is one and a half times that of oxygen. Andrews showed later that ozone is rapidly destroyed when shaken up with dry fragments of glass, &c. He also proved that the effect which is (almost invariably, and sometimes in fine weather powerfully) produced by the air on what are called ozone-test papers—papers steeped in iodide of potassium which are rendered brown by the liberation of iodine—is really due to ozone. He did so by showing that it acts upon mercury as ozone does, and that it is destroyed by heat at the same temperature.

The quantity of ozone in the atmosphere is never great, and it varies within wide limits. Little or nothing is known as to its function in the air, but it is believed to be active in destroying unwholesome substances, owing to its intensely oxidising properties. Ozone has been liquefied by the application of pressure, at a temperature of about − 23° C. It is stated to be blue in the liquid state, and to be liable to decomposition into oxygen, with explosive violence, on sudden diminution of pressure.

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P

P is the sixteenth letter in our alphabet. The symbol was derived from the hieroglyphic picture of a shutter (see ALPHABET). When taken over by the Semites, the sign was called *pe*, 'the mouth,' a name explained by the fact that in the Egyptian hieratic, from which the Phœnician sign was obtained, there are strokes resembling teeth, which, however, disappeared before the date of the earliest extant Phœnician inscriptions. The oldest Greek form was ⊓, which differs little from the Phœnician letter. In the Latin alphabet the hook gradually became a loop, giving the form P, and this being the old form of R, the latter acquired a tail to distinguish it. In the later Greek alphabet P continued to be the sign for *r*, and the sign for *p* was differentiated by lengthening the hook, giving ultimately the form Π for the letter *pi*.

The sound of *p* is the sharp labial mute. Hence it interchanges with other labials, especially with *b*, the flat labial mute. Most languages give a preference to one of these two sounds. Thus, the Etruscans preferred *p*, and have no *b* in their alphabet, whereas the Teutonic languages dislike *p*, especially as an initial. Only six primitive Teutonic words, all probably loan words, begin with *p*, and in Beowulf and Cædmon, taken together, only three such words are found. In Mœso-Gothic the Greek *p* was used by Ulphilas, but only for foreign words, such as Paul, Pontius Pilate, prophet, and presbyter. Most of our English words beginning with *p*, such as plough, parish, people, or prince, are loan words from Greek, Latin, or Celtic. A primitive Aryan *p* corresponds to a Teutonic *f*, and it is only a primitive *b*, a very rare letter, which can correspond to a Teutonic *p*. A Welsh *p* corresponds to a Gaelic *c* and an English *f*. Thus, the Gaelic *mac*, 'son,' is the Welsh *map* or *ap*. The Gaelic *cethair* is the Welsh *pedwar*, and the English *four*; and the Gaelic *coic* is the Welsh *pump*, and the English *five*. Owing to French influence the English prejudice against *p* begins to disappear in the 13th century, and we get *gossip* instead of the older *godsib*, *apricot* for *abricot*, and *purse* for *borse*, though even here the *b* is retained in the derived verb to *disburse*. A *p* also intrudes between *m* and *t*, as in *empty* for the Old English *æmtig*, and in *tempt* from the Old French *tenter*. In Latin *p* intrudes also between *m* and *l*, as in the words *exemplum* and *templum*. In like case, as in *humble* from *humilis*, *b* is usually the intrusive letter in English words.

Pabna, a town of Bengal, India, stands on an arm of the Ganges, 115 miles N. of Calcutta. Pop. 15,267.—The *district* has an area of 1847 sq. m. and a pop. (1881) of 1,311,728.

Paca (*Cœlogenys*, i.e. 'hollow-cheek'), a remarkable genus of rodents, allied to the Agoutis (Dasyprocta), represented by a single species (*C. paca*), which ranges in Central and South America from Guatemala to Paraguay, east of the Andes. Its cheek-bones are uniquely developed, the zygomatic arch being enlarged to form a great cavity on each side. Each communicates by a narrow aperture with the mouth, is lined by mucous membrane, and does not contain food as an ordinary cheek-pouch naturally does. Their function, if they have any, is unknown. The paca is large for a rodent, being about 2 feet in length. It is stout and somewhat pig-like in build, with a large blunt head,

Paca (*Cœlogenys paca*).

cloven lip, small ears, stump-like tail, thick legs, five-toed feet, and rounded back. The colour is brownish yellow above, whitish below, with whitish-yellow spots or longitudinal bands along the sides. Though somewhat clumsy in form and gait, the paca runs actively, and can swim well. It lives alone or in pairs in the moist forests, especially by sides of rivers, and tends to be nocturnal in its habits. It makes burrows, which are said to have three openings. The female bears only one or two young at a birth. As a vegetable eater, the paca sometimes does damage to sugar-cane plantations and gardens. Its fat, pork-like flesh is much esteemed.

Pace. See YARD.

Pachacamac, a village of Peru, 18 miles SE. of Lima, with the ruins of a temple from which Pizarro took immense treasure.

Pachmarhi, a sanitarium and convalescent depôt for European troops in India, is situated, 2500 feet above the plains, in the Central Provinces, 110 miles SW. of Jabalpur.

Pachomius, an Egyptian monk of the 4th century, the first to substitute for the free asceticism of the solitary recluse a regular cœnobitic system. He was born about 292, and about 340 founded the first monastic institution at Tabenna, an island in the Nile, where ere long there were as many as 1400 monks. He also established the first convent for nuns, which was under the presidency of his sister, and he laboured with so much diligence and zeal that at his death, according to Palladius, not fewer than 7000 monks and nuns were under his inspection. The writings ascribed to Pachomius are not only worthless in themselves, but of dubious authenticity. See the article MONACHISM.

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Pachyder'mata (Gr., 'thick-skins'), a term applied by Cuvier to hoofed mammals (Ungulates) which are not ruminants—e.g. elephants, hyrax, hog, hippopotamus, tapir, rhinoceros, horse, &c.—and which have thick skins. For many good reasons the term is no longer much used. See MAMMALS.

Pacific Ocean.—*Position and Extent.*—The Pacific Ocean is the largest of the great divisions of the ocean, occupying as it does about one-half of the water-surface of the globe and more than one-third of the whole area of the world. It is almost landlocked towards the north, communicating with the Arctic Ocean by the narrow and shallow Behring Strait, only about 40 miles in width, whereas towards the south it opens widely into the great deep Southern and Antarctic Oceans. Looking upon its southern boundary as the Antarctic Circle, its length from north to south is about 9000 miles, while its greatest breadth at the equator is over 10,000 miles. Its area is approximately nearly 70,000,000 sq. m.

History.—The Pacific was first seen by Europeans in 1513, when a Spaniard, Balboa, with a few followers, viewed its waters from the summit of a mountain in Panama; Columbus was aware of its existence, but did not live to see it. The first European to sail upon it was Magellan, who in 1520 entered it after threading his way through the strait bearing his name, and he gave it the designation 'Pacific,' by which it is known to the present day. From about this time trade was established between Europe and the Pacific coasts through the Strait of Magellan and round Cape Horn. Sir Francis Drake was the first Englishman to sail upon it, entering it in 1577, and afterwards sailing across it as far as the Moluccas. The explorers of the 17th century discovered Australia, New Zealand, and other islands, and during the 18th century the work of exploration was carried on by numerous voyagers, whose names are famous in the annals of geographical discovery. Many of them attempted to find passages between the Atlantic and Pacific through the Arctic Ocean; but the problem remained unsolved until Maclure in 1850 discovered the North-west Passage, and Nordenskiöld in 1874 the North-east Passage. The routes are, however, of no practical utility. During the 19th century many exploring and surveying expeditions have completely investigated the region of the Pacific, and among the more recent scientific expeditions special mention may be made of that of H.M.S. *Challenger*.

River-systems.—Compared with the enormous expanse of the Pacific the area of land draining into it is comparatively insignificant—7,500,000 sq. m., being less than half of that draining into the Atlantic. By far the greater proportion of the land of North and South America drains into the Atlantic, the Andes and Rocky Mountains, which form the watershed, running north and south in more or less close proximity to the Pacific coast. The largest American river is the Yukon in the extreme north, which is over 2000 miles in length, and flows into Behring Sea. Proceeding south, we find the Fraser (600 miles long), the Columbia or Oregon (750), the Sacramento (420), and the Colorado (1100). The South American rivers draining into the Pacific are little more than mountain-streams. The Asiatic rivers flowing into the Pacific include some of the largest and most important rivers of the world. There is the Amur, 3060 miles in length, flowing into the sea of Okhotsk, and with its tributaries draining an area of nearly 900,000 sq. m.; the Hoang-ho, over 3000 miles long, and the Yang-tse-kiang, 3200 miles in length, falling into the Yellow Sea, the combined drainage area of which two rivers is estimated to exceed 1,250,000 sq. m.; whilst flowing into the China Sea there are the Choo-kiang, the Mekhong, and the Menam. The rivers of Australia draining into the Pacific are of slight importance and small size. The total annual rainfall on the catchment basin of the Pacific is estimated at about 5000 cubic miles; the annual river discharge at a little over a fifth of that amount.

Coasts and Seas.—Generally speaking, the American and Australian coasts bordering the Pacific are mountainous and free from indentations, while the Asiatic coasts are low and fertile, with many gulfs and bays, and fringed with island groups enclosing numerous seas. The Alaskan shores of North America are low and swampy, while the coast farther south is rocky and rugged, with numerous inlets and off-lying islands. The most considerable indentation of the whole American Pacific coast is the Gulf of California, the Gulfs of Panama and Guayaquil being the only others of importance. The southern extremity of South America presents a complete contrast to the rest of the coast-line, being broken up into numerous bays with scattered islands, the winding Strait of Magellan separating Tierra del Fuego from the mainland. The contour of the Asiatic coast-line is much more diversified than that of America, being especially characterised by the off-lying seas more or less completely enclosed and cut off from communication with the open ocean. Behring Sea is separated from the Pacific basin by the peninsula of Alaska and the Aleutian Islands, communicating with the Arctic Ocean through Behring Strait. The Sea of Okhotsk is divided from Behring Sea by the peninsula of Kamchatka, and from the basin of the Pacific by the Kurile Islands. The Sea of Japan is cut off from the ocean by the Japanese islands, from the Sea of Okhotsk by the island of Saghalien, and from the Yellow Sea by the peninsula of Corea. The Yellow Sea is an extensive indentation of the Chinese coast, and is so named from the large amount of ochreous material brought down by the great rivers Hoang-ho and Yang-tse-kiang, which flow into it. The China Sea is separated from the Pacific by the island of Formosa, the Philippine Islands, the island of Palawan, and Borneo, and from the Indian Ocean by the Malay peninsula; it includes the two extensive Gulfs of Tonquin and Siam. The islands of the East Indian Archipelago cut up this part of the Pacific into several more or less distinct seas, known as the Sulu, Celebes, Java, Banda, and Arafura Seas, the last named lying between the north coast of Australia and New Guinea, and including the Gulf of Carpentaria. The Coral Sea is enclosed by the north-east coast of Australia, New Guinea, New Britain, the Solomon Islands, the New Hebrides, and New Caledonia, and communicates with the Arafura Sea by Torres Strait. The Pacific coast of Australia is mountainous and free from any considerable inlets, the most important harbours being Moreton Bay and Port Jackson, the latter one of the finest in the world. Bass Strait separates the island of Tasmania from Australia. The main islands of New Zealand are separated by Cook Strait, and the principal bays are the Gulf of Hauraki, Bay of Plenty, Hawke Bay, and Pegasus Bay.

Islands.—The Pacific Ocean is remarkable for the innumerable small islands and island groups which stud its surface, but the area occupied by the truly oceanic islands is very small; they are principally congregated towards the central and western portions of its basin, the eastern portion, for some considerable distance off the American coasts, being comparatively free from islands. The principal continental islands may be briefly enumerated: commencing at the southern point of

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South America, and proceeding northwards along the American coast, then southwards along the Asiatic coast, we have Tierra del Fuego and the islands off the coast of Chili; Vancouver, Queen Charlotte, Prince of Wales, and other islands off the coast of British North America; Kodiak Island, off the Alaskan coast; the Aleutian chain of islands, stretching from the Alaskan peninsula towards the Asiatic coast and enclosing Behring Sea; the Kurile Islands, stretching from the peninsula of Kamchatka to the Japanese Islands; Saghalien; the islands of Japan; Formosa and Hainan, off the Chinese coast; the Philippine Islands; Borneo, Celebes, Sumatra, Java, and other islands of the East Indian Archipelago; New Guinea; New Caledonia; Australia and Tasmania; and New Zealand. The oceanic islands of the Pacific are all either of volcanic or coral origin, the volcanic islands lying within the zone of coral-reef builders being fringed with coral-reefs, while there are large numbers of islands entirely of coral formation—coral atolls. The principal groups are the Sandwich Islands, in the centre of the North Pacific basin, 18° to 22° N. lat., consisting of eight larger and four smaller islands, containing many active and extinct volcanoes, including the well-known Kilauea in Hawaii, said to be the largest active crater in the world; the Bonin Islands, south-east of Japan; the Ladrone or Mariana Islands, between 13° and 20° N. lat., containing several active volcanoes; the Caroline Islands, south of the Ladrones, mostly of coral formation; the Marshall Islands, east of the Carolines, entirely of coral formation; the Gilbert Islands, on the equator, of coral formation and densely populated; in the South Pacific there are the Solomon Islands, the New Hebrides, the Fiji Islands, the Friendly Islands, the Samoa or Navigator Islands, the Society Islands, all fringed by coral-reefs, and the Paumotu or Low Archipelago, an extensive group of coral islands lying between 10° and 25° S. lat., besides the volcanic Galapagos group on the equator about 600 miles off the coast of Ecuador, and others of less extent and importance.

Depth.—The Pacific was formerly looked upon as rather a shallow ocean, but we now know that some of the greatest depths in the world occur in it, and that on the whole it is deeper than the Atlantic, its mean depth being about 2500 fathoms. The eastern basin is comparatively uniform in depth, between 2000 and 3000 fathoms, except a large area under 2000 fathoms extending from off the coast of Chili in a westerly direction for over 40° of longitude, while off the north-west coast of North America the 2000 fathom line lies a considerable distance off-shore. The western basin is much more diversified, numerous groups of islands, shallow water, and immense depths occurring irregularly; the greatest depths yet sounded are found in this region of the Pacific. The *Challenger's* deepest sounding, 4575 fathoms (nearly 5½ miles), was in the sea between the Caroline and Ladrone Islands, while the American ship *Tuscarora* found a depth of 4655 fathoms to the north-east of Japan, where a large area of very deep water extends off the Kurile Islands and Japanese coast; more recently depths of over 4000 fathoms have been discovered off the coast of Chili, and a British surveying ship has sounded in 4530 fathoms east of the Fiji Islands, which is the deepest sounding recorded south of the equator. There are many detached patches throughout the Pacific with depths of over 3000 fathoms. The seas bordering on the western basin of the Pacific vary considerably in depth: the depth in the Sea of Okhotsk, the Yellow Sea, and the Java Sea does not apparently exceed 700 fathoms; and the Behring Sea, the Sea of Japan, and the Arafura Sea are all under 1500 fathoms; while the China Sea, Celebes Sea, Sulu Sea, and the Banda Sea are in some places over 2000 fathoms in depth. The bulk of water filling the Pacific is estimated at 170,000,000 cubic miles.

Winds and Currents.—The surface-currents of the Pacific Ocean depend to a great extent upon the direction of the prevailing winds, the principal of which are the two trade-winds, blowing more or less constantly, the one from the north-east, the other from the south-east. Between these two regions is what is called the equatorial belt of calms, which is found all the year round north of the equator in the eastern Pacific, but in the west Pacific it is south of the equator during the summer of the southern hemisphere, and during the southern winter it is replaced by a regular southerly breeze; north and south of the trade-winds, also, there are two other belts of calms. In addition to the trade-winds, there are the monsoons, which blow with great regularity, but the direction of which changes according to the season. Monsoons are especially prevalent in the west Pacific, their general direction being south-east, north-east, or north-west, and they cause surface-currents, the direction of which likewise changes with the season. The differences between the temperature and atmospheric pressure over the land and over the water cause monsoonal winds. In mid-ocean the winds are found to have a greater velocity than in the vicinity of the land.

The Pacific is practically cut off, as far as the circulation of the deep water is concerned, from communication with the Arctic Ocean in the north, but towards the south it has uninterrupted communication with the Antarctic. A cold surface-current flows constantly northwards from the Antarctic, dividing into two at Cape Horn, one entering the Atlantic, the other flowing along the coasts of Chili and Peru, thence turning to the westwards; but the cold water frequently met with along the eastern coasts of America is evidently brought from oceanic depths by the action of off-shore winds. The great equatorial current flows to the westward, divided by a counter-current running in an opposite direction into two branches, the northern one on approaching the Asiatic coast being deflected northwards and finally north-eastwards as the Japan current, which is comparable to the Gulf Stream in the Atlantic; the southern branch is diverted to the southward, flowing along the shores of Australia and New Zealand, thence curving eastwards, and ultimately merging into the Antarctic surface-current. There are many minor currents, and branches of these more important ones, diverted by the numerous groups of islands. The broad currents, circling in the one direction in the North Pacific and in the opposite direction in the South Pacific, enclose in their centres two miniature Sargasso Seas somewhat similar to that of the North Atlantic, though not so well marked.

Temperature of the Water.—The temperature of the surface-waters of the Pacific varies with the season, but in the tropical regions the variation is very small. Between the latitudes of 45° N. and 45° S. the temperature of the surface is always above 50° F., while north and south of these latitudes it is nearly always below 50° F. The highest temperature occurs among the islands of the Malay Archipelago and off the Mexican coast, where the mean temperature rises to 85° F., and in the sea between Japan and New Guinea the temperature in August reaches 84° F. In the South Pacific the temperature of the surface-water is apparently higher than that of the air, while in the North Pacific the reverse is the case in some places. The temperature of the water below the surface

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as a general rule decreases as the depth increases, the lowest temperature occurring at the bottom in great depths, where the bottom temperature appears to be nearly constant all the year round, usually about 35° F., varying to a slight extent in different parts of the ocean from 34°·7 to 35°·5 F. This refers only to the open ocean, for in the enclosed seas of the western basin of the Pacific the minimum temperature is usually found some distance above the bottom, depending upon the depth of water over the barrier cutting off the sea from the general oceanic circulation, the body of water below that depth being of a uniform temperature. As a typical example we may cite the Sulu Sea, where at a depth of 400 fathoms a minimum temperature of 50°·5 F. is reached, and this temperature continues down to the bottom in 2500 fathoms. The temperature of the intermediate water in the open ocean decreases rapidly at first from the surface downwards, and then slowly down to the bottom, a temperature of 40° F. being usually met with at a depth of between 300 and 400 fathoms, irrespective of the surface temperature, which may vary from below 60° to over 80° F.

Salinity.—The salinity of the surface-waters of the ocean changes with the season; increase of evaporation raises, while precipitation in the form of rain lowers, the salinity. In the South Pacific there is a region of high salinity in the neighbourhood of the Society Islands, the maximum salinity being 1·02750 (taking pure water at 4° C. as unity); in the North Pacific the salinity is never so high, the maximum being 1·02650, while in some regions the salinity falls to 1·02485. The surface-water of the partially enclosed seas of the western portion of the Pacific is naturally much fresher than that of the open ocean, due principally to the exceptionally heavy rainfall.

Deposits.—The Pacific Ocean, as might be supposed from its great extent and its great range in depth, contains all the varieties of marine deposits from those of shallow water to those found only in the greatest depths of the ocean. These deposits will be dealt with in the article SEA; see also works cited at CHALLENGER, CORAL, POLYNESIA; the *Scottish Geographical Magazine*, vol. iv.; and an article by the present writer in *Nature*, vol. xxxix.

Pacific Railways. See RAILWAY, CANADA, UNITED STATES.

Packard, ALPHEUS SPRING, an American naturalist, son of the historian of Bowdoin College, was born at Brunswick, Maine, 19th February 1839, graduated at Bowdoin in 1861, and was for a time assistant to Agassiz at Cambridge. He took part in several scientific expeditions, was state entomologist of Massachusetts in 1871–73, and lectured at Bowdoin and elsewhere. In 1878 he became professor of Zoology and Geology at Brown University. But he is best known as a distinguished entomologist; his classification of insects, proposed in 1863, has been generally accepted. As an evolutionist, Professor Packard is one of the leaders of the 'Neo-Lamarckian' school (see LAMARCK). Besides popular works and text-books, his writings include *Structure of the Ovipositor of Insects* (1868), *Development and Anatomy of Limulus Polyphemus* (1871–85), *The Cave Fauna of North America* (1888), *The Labrador Coast* (1891), monographs on the geometrid moths, the locust's brain, phyllopod crustacea, &c.

Packfong, or PETONG, a Chinese alloy or white metal, consisting of arsenic and copper.

Paco. See ALPACA.

Pactolus, anciently the name of a small brook of Lydia, in Asia Minor, which rises on the northern slope of Mount Tmolus (modern *Buz Dagh*), flows north past Sardis (*Sart*), and empties itself into the Hermus (*Kodus*). It is never more than ten feet broad and one foot deep. The sands or mud of Pactolus were long famous in antiquity for the particles of gold-dust which they contained. The collection of these particles, according to legend, was the source of Crœsus' vast wealth. The brook is now called *Sarabat*.

Pacuvius, the earliest of Roman tragic poets, the sister's son of Ennius, was born at Brundisium about 220 B.C., lived mostly in Rome, and died at Tarentum, ninety years of age (130 B.C.). His dramas, of which only fragments are extant, were formed after Greek models. See Ribbeck, *Tragicorum Latinorum Reliquiæ* (1871).

Padang, capital of a residency on the west coast of Sumatra, and seat of the Dutch governor of the west coast province, is situated at the mouth of the Padang River, and has a brisk trade. Pop. 15,000. The residencies of Padang and the Padang Highlands have a joint pop. of (1886) 869,760.

Paddy. See RICE.

Padella (Ital., 'a frying-pan;' plur. *padelle*), a shallow vessel of metal or earthenware used in illuminations.

Paderborn, a town of Westphalia, situated 50 miles SW. of Hanover, at the sources of the Pader, a tributary of the Lippe. It has been largely rebuilt since a destructive fire in 1875. The fine Romanesque cathedral (Roman Catholic), completed in 1163, is built over the sources of the Pader, and contains the silver coffin of St Liborius. Other noticeable edifices are St Bartholomew's Chapel (1017) and the town-house (1615; restored 1870–76). The manufactures include glass, soap, and tobacco factories, breweries, distilleries, railway and printing works; the town carries on a considerable trade in cattle, fruit, and wool. There are mineral springs close by. At Paderborn Charlemagne held his first diet with the conquered Saxons. It was a Hanse town. In 1622 it was sacked by the Duke of Brunswick, and it changed hands more than once during the Thirty Years' War. From 1614 to 1819 it was the seat of a Roman Catholic university. Pop. (1885) 16,624.

Padiham, a town of Lancashire, 3 miles W. of Burnley and 8 NE. of Blackburn. Cotton is the staple manufacture, with coal-mining and stone-quarrying. Pop. (1881), with Hapton, 8974.

Padilla, JUAN DE, one of the most popular heroes in Spanish history, was a scion of a Toledan family, and was appointed by the Emperor Charles V. military commandant of Saragossa. While he was so employed a formidable rebellion, caused by the excessive taxes which the emperor imposed on the Spaniards, to defray the cost of his various wars in Italy, Germany, and the Low Countries, broke out among the towns of Castile, and the rebels, who were known as *communeros*, called upon Padilla to put himself at their head. He was successful in a number of enterprises undertaken against the royalist party, but on 23d April 1521 was completely beaten at Villalos. This conflict decided the fate of the rebellion and of Padilla himself, who was taken prisoner, and next day beheaded. His wife, Donna Maria de Pacheco, rallied the remnants of the rebel army, and for a long time held Toledo against the royalist besieging army; after its fall she retired to Portugal, where she died in 1531. Numerous poems and dramas celebrate their deeds.

Padishah, in Turkish PADISHAG (Persian *padi*, 'protector' or 'throne;' *shah*, 'prince'), one of the titles of the Sultan of the Ottoman empire, and of the Shah of Persia.

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Padua (Ital. *Padova*), a city of North Italy, 23 miles by rail W. by S. of Venice and 18 SE. of Vicenza, is still surrounded with walls. The principal streets are lined with arcades; most of the others, especially in the older parts, are narrow, dark, and ill-paved; but there are several handsome squares and fine gates. The first place among the public buildings belongs to the municipal palace (1172–1219), a huge structure resting on arches, with balconies running round the upper story. The roof (1420) of its great hall (267½ feet long, by 89 wide, and 78 high) is perhaps the largest in Europe unsupported by pillars. The churches (nearly fifty) include the cathedral (1552–1754); St Antony (1230–1307), said to have been designed by Niccola da Pisano, a building in the Pointed style, with Byzantine blendings, and a richly decorated interior by Donatello, Sansovino, and others—the bones of St Antony rest in a side-chapel; St Justina (16th century), a fine Renaissance church, with an altarpiece by Veronese, and other pictures; church of the Eremitani (13th century), with frescoes by Mantegna; the chapel of the Annunciation (1303), adorned with frescoes by Giotto; and the chapel of St George (1377), with frescoes by Avanzi and Altichieri. The 'saint's school' is adorned with frescoes by Titian and his pupils, illustrating the life of St Antony. Donatello's fine equestrian statue of Gattamelata, the Venetian captain, stands in front of the church of St Antony. Padua has enjoyed greatest fame from her university, founded by the emperor Frederick II. in 1221, though the fine Renaissance buildings date from 1493–1552; there are now 80 teachers and 1100 students. To it is attached one of the oldest botanical gardens in Europe, and a library (1629) of 158,500 vols. and 2500 MSS. The city museum (1881) contains antiquarian, art, and numismatic collections, a library, and archives. There is not much industry or much commerce, though leather, cloth, and gut-strings are prepared. Pop. (1881) 47,334. Padua's most celebrated natives were Livy and Mantegna. One of the oldest cities in Italy, *Patavia* came under the Roman supremacy in 215 B.C. In the 5th century it was severely handled by the Huns, and was handied to and fro between the Goths and the Eastern empire. From the Lombards it passed to the Franks (774); during the Guelph and Ghibelline quarrel it alternately submitted to the emperors and sided with the Lombard cities. In 1318 it took to itself as lord the head of the Carrara family, who ruled it till it was conquered by Venice in 1405. Venice kept it till 1797, when it was given to Austria, who held it (except from 1805–14) until it was incorporated in Italy in 1866. The *province* has an area of 797 sq. m. and pop. (1889) of 437,656.

Padu'cah, capital of McCracken county, Kentucky, on the Ohio River, 48 miles above its mouth, and just below the entrance of the Tennessee, 226 miles by rail WSW. of Louisville. It has a large trade by river and rail, and contains shipyards, foundries, railway-shops, flour, saw, and planing mills, and manufactories of soap, vinegar, ice, furniture, tobacco, &c. Pop. (1890) 13,076.

Pæan (of doubtful etymology), the name given by the ancient Greeks to a kind of lyric poetry originally connected with the worship of Apollo.

Pædo-baptism. See BAPTISM.

Pæony. See PEONY.

Pæstum, anciently a Greek city of Lucania, in Southern Italy, on the present Gulf of Salerno. It was founded by the Sybarites some time between 650 and 600 B.C., and was originally called Posidonia. It was subdued by the Lucanians, and from them passed to the Romans, who established a colony there about 273 B.C. The Latin poets sing the praises of its roses, which bloomed twice a year. Pæstum was burned by the Saracens in the 9th century, and ravaged by Robert Guiscard in the 11th, and never recovered from these disasters. Portions of the ancient walls and three well-preserved Doric temples remain. See Labrouste, *Les Temples de Pæstum* (1877).

Pagân. See BURMA, Vol. II. p. 566.

Paganini, NICOLO, the famous violinist, was born a porter's son at Genoa on 18th February 1784. His genius showed itself early, and, practising sometimes a single passage for ten hours running, he acquired a mastery over his instrument that has never been equalled; the vulgar, indeed, ascribed it to diabolic agency. It must be confessed he was too much addicted to mere feats of musical legerdemain. He gave his first concert as early as 1793; began his professional tours in Italy in 1805; in 1827 received from the pope the order of the Golden Spur; in 1828–29 made a great sensation in the chief towns of Austria and Germany; and in 1831 created an equal *furore* in Paris and London. He had gambled much in youth, but he returned very rich to Italy; and he died at Nice on 27th May 1840, drawing a last long note on his favourite G string.

See his Life in French by Fétis (1851), in Italian by Bruni (1873), and in German by Niggli (1882); also vol. ii. of Grove's *Dictionary of Music* (1880), and Engel's *From Mozart to Mario* (1886).

Page (derivation variously assigned to Gr. *pais*, 'a boy,' and Lat. *pagus*, 'a village'), a youth of noble or good birth employed in the service of a royal or noble personage. The practice of employing youths of noble birth in personal attendance on the sovereign existed in early times among the Persians and Romans, and was a special feature of feudal chivalry in the middle ages. The degree of page was preparatory to the further degrees of esquire and knight. The practice of educating the higher nobility as pages at court began to decline after the 15th century. Pages still figure, however, on ceremonial occasions at the chief courts of Europe. The Corps of Pages at St Petersburg is a cadet school for the Russian Guards.

Paget, SIR GEORGE EDWARD, K.C.B., was born at Yarmouth in 1809, and educated at the Charterhouse and at Cambridge. He took his B.A. degree in 1831, became Fellow of Caius in 1832, M.D. in 1838, D.C.L. Oxford and Durham, LL.D. Edinburgh, and F.R.S. in 1855. In 1872 he became regius professor of Physic in Cambridge, in 1885 K.C.B., and died 30th January 1892. He may well be regarded as a public benefactor, as having taken the principal part in the great advance that has been made of late years in the education of medical practitioners.—His brother, SIR JAMES PAGET, Bart., was born at Yarmouth in 1814. He became member of the Royal College of Surgeons in 1836, Hon. Fellow in 1843, member of the Council in 1865, president of the College in 1875, Bradshawe Lecturer in 1882. Serjeant-surgeon to the Queen, surgeon to the Prince of Wales, and consulting surgeon to St Bartholomew's Hospital, he was created baronet in 1871, and in the same year LL.D. of the university of Edinburgh. Two standard works are *Lectures on Surgical Pathology* (1853; 4th ed. 1876), and *Clinical Lectures* (1875). He is vice-chancellor of the university of London, and a member of the Institute of France (Academy of Sciences).

Pagoda (a Portuguese corruption of the Persian *but-kadah*, 'idol-temple') is originally an Indian temple of the approximately pyramidal shape especially characteristic of the Dravidian style (see Vol. VI. p. 109). Thus, the great pagoda at

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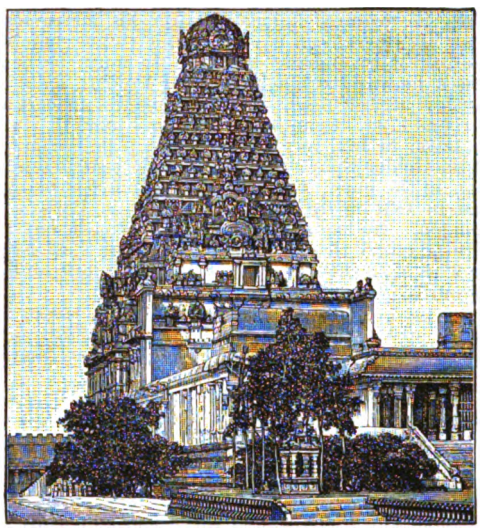
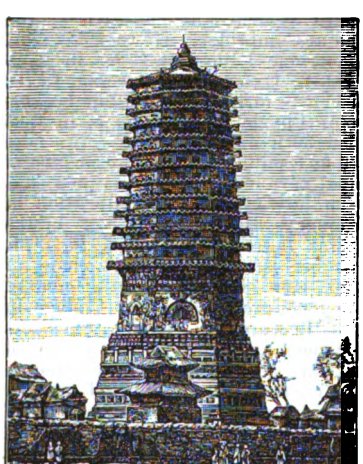
Tanjore has a perpendicular part two stories in height, 82 feet square, and above that thirteen stories, forming an elongated pyramid about 100 feet high. The basement section is simple in outlines, but adorned by niches and pilasters; the pyramidal portion is somewhat elaborately sculptured; and the whole is crowned by a dome (said to consist of a single stone), which brings the total height to 190 feet. The temple stands in one of two great courtyards, and in the same court stand several small shrines, one of which is so beautifully carved as to rival in interest the great temple.



Pagoda at Tanjore.

The date of the latter is not certainly known, but is with much probability referred to the beginning of the 14th century. The so-called 'Thousand Pagodas' of Brambanan (q.v.) in Java are obviously modelled on Hindu originals, either Jain or Buddhist. The Burmese pagodas are described and illustrated at Vol. II. p. 565. The term is also loosely applied to the Chinese *taa*, or tapering tower, of which the most famous was the Porcelain Tower of Nanking, described at Vol. III. p. 186. This was erected in the beginning of the 15th century; only nine of the proposed thirteen stories, cased in white porcelain, were completed, and the height never exceeded about 260 feet. It was destroyed by the Taipings in 1856. First-class pagodas have seven, nine, or thirteen stories, the more numerous second-class ones usually three or five. Pagodas are occasionally still erected—sometimes of iron.



Chinese Pagoda of Thirteen Stories.

Pahlanpur, or PALANPUR, a town of India, capital of a native state (area, 3150 sq. m.; pop. 234,402) of the same name, 83 miles N. of Ahmadabad in Bombay Presidency. Pop. 17,547. The *Pahlanpur agency* comprises Pahlanpur and twelve other states in the north of Bombay, with an area of 8000 sq. m. and a pop. (1881) of 576,478.

Paine, THOMAS, deistical and radical writer, was born at Thetford in Norfolk on 29th January 1737, the son of an ex-Quaker staymaker. He himself had by turns been staymaker and marine, schoolmaster, exciseman, and tobacconist, had married twice, losing his first wife, and soon divorcing the second, when in 1774, with introductions from Franklin, he sailed for Philadelphia. On 1st January 1776 appeared his pamphlet *Common Sense*, which argued simply but strongly for complete independence, and which in Washington's words, 'worked a powerful change in the minds of many men.' His *Crisis*, a twelvemonth later, gave the battle-cry, 'These are the times that try men's souls,' for the Americans' first victory at Trenton, where Paine himself was serving as a private; and congress rewarded him with the post of Secretary to the Committee of Foreign Affairs. He lost that post in 1779 for divulging state secrets, but was appointed clerk of the Pennsylvania legislature, and in 1785 received from congress $3000 and the confiscated farm of New Rochelle. In 1787 he returned, by Paris, to England, where in 1791-92 he published *The Rights of Man*, the most famous of all the replies to Burke's *Reflections upon the French Revolution*. The work, of which a million and a half copies were sold in England alone, involved many in heavy penalties; Thomas Muir, for instance, for circulating it got fourteen years' transportation. Paine, however, had slipped off to Paris, having been elected by the department of Pas-de-Calais its deputy to the National Convention. Here he voted with the Girondists, and at Louis XVI.'s trial he 'alone,' says Madame de Staël, 'proposed what would have done France honour—the offer to the king of an asylum in America.' He thereby offended the Robespierre faction, and in 1794 was thrown into prison; just before his arrest having written part i. of *The Age of Reason*, against Atheism and against Christianity, and in favour of Deism. Part ii. appeared in 1795, and a portion of part iii. in 1807. The book alienated Washington and most of his old friends; and it was not till after an imprisonment of eleven months that he was released and restored to his seat in the Convention. He became, however, disgusted with French politics, and occupied himself chiefly with the study of finance, till in 1802 he returned to America in a ship placed at his service by President Jefferson. His last years were sullied by intemperance, and he died at New York on 8th June 1809. In 1819 his bones were removed by Cobbett (q.v.) from New Rochelle to England; their whereabouts since 1847 is unknown. 'Paine's ignorance,' says Leslie Stephen, 'was vast and his language brutal; but he had the gift of a true demagogue—the power of wielding a fine vigorous English.'

The completest edition of his works is that by Mendum (3 vols. Boston, 1850); of his numerous biographies may be mentioned those by 'Francis Oldys' (i.e. George Chalmers, 1791), Cheetham (1809), Rickman (1814), Sherwin (1819), Vale (1841), and Blanchard (1860). See also Leslie Stephen's *History of English Thought in the Eighteenth Century* (1880); an article by Moncure D. Conway in the *Fortnightly* for March 1879; and Alger's *Englishmen in the French Revolution* (1889).

Pains and Penalties. See ATTAINDER.

Painted Lady. See BUTTERFLY, II. 589.

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Painter, WILLIAM, author of the *Palace of Pleasure*, was most probably a Kentishman, and born about 1525. He seems to have been master of Sevenoaks school about 1560, but early next year became Clerk of the Ordnance in the Tower, with a stipend of eightpence a day. He kept this post all his days, married, seems to have had a somewhat easy standard of honesty, grew rich, and bought lands. He made his will in 1594, and died probably soon after. In 1566 he published the first volume of *The Palace of Pleasure* 'beautified, adorned, and well furnished, with Pleasant Histories and Excellent Nouells selected out of divers good and commendable authors;' the second volume, 'containing manifold store of goodly Histories, Tragical matters, and other Moral argument, very requisite for delight and profit,' followed in 1567. Of the first volume the principal source was the *Heptameron;* of the second, Bandello, through the medium of the French translations of Boaistuau and Belleforest; but, in the definitive edition of the whole work (1575), to both parts stories were added from Boccaccio, Ser Giovanni, and Straparola. These last two at least he must have taken directly from the Italian. Painter's work became exceedingly popular, and indeed was the main source whence many dramatists drew their plots. Even in almost all Shakespeare's comedies we see the prevalence of the convention in early English comedy in favour of Italian plots, names, and places. Ascham in the *Scholemaster* denounces the 'bawdie stories . . . enchantments of Circes, brought out of Italie, to marre mens maners in England,' and there can be little doubt that here he points directly at Painter, though he does not name his book. Painter's English is easy and unaffected, but lacks the dignity the reader expects of an Elizabethan. His book is the largest work in prose between the *Morte Darthur* and North's *Plutarch*, but its real importance is that it introduced into our literature many of the best novels of Boccaccio, Bandello, and Margaret of Navarre.

Joseph Haslewood edited an admirable edition in 1813 (2 vols.); a later is that by Joseph Jacobs (3 vols. 1890).

Painter's Colic. See LEAD-POISONING.

Painting. It is convenient to divide this slight sketch of the history of painting into two sections, the first dealing with the technical, and the second with the intellectual, history of the art.

(1) *The Technical History of Painting.*—The importance of technical conditions in the fine arts is due to their influence upon the action of the mind. For example, fresco-painting, if genuine, requires both speed and decision, oil-painting permits deliberation and correction almost without limit. Water-colour occupies, as to hurry, a position between the two. A technical facility allures the mind in certain directions, a technical difficulty impedes it, and a technical impossibility, like an insurmountable obstacle, diverts its energy into another channel. Each art has its own educational influence on the artist who practises it. Albert Dürer was an engraver with the burin, and he carried the strictness and precision of the burin into his painting; Rembrandt was an etcher, and he painted with an etcher's freedom; Turner was a water-colour painter, and his practice in oil bears evidence of his other skill. Fresco was painted either from drawings or from pure imagination. The deliberation possible in oil has led to painting from the life, with its consequences of increased reality, better knowledge, and more perfect truth. The improvement in water-colour has done for landscape what oil has done for the figure. As water-colour dries quickly it is convenient for sketching from nature, so that modern landscape-painters have been induced to study more in colour than their predecessors, a practice which has brought about a revolution in landscape-painting by taking it from the studio and the gallery into the open air.

The extreme importance of technical conditions may be made still clearer by a reference to the sister arts. With the burin in his hand, the most impetuous of men must be disciplined by the instrument itself till he becomes cautious, careful, and methodical. A sculptor may love marble, but he does not sketch or invent in it; he sketches in wax or clay. Bronze can be cast into the most picturesque forms, but the granite of Egypt imposed a severe simplicity.

Painting was not, in its origin, an independent art. It was employed in subservience to sculpture, to architecture, and to primitive engraving quite unconnected with printing. Rude idols were coloured in imitation of life, or rude outlines incised in stone or wood were filled up with spaces of colour sharply separated and clearly distinguished. The outlines might also be themselves painted and then filled up with colour. Painting was separated from sculpture and engraving long before it was separated from hard and definite linear drawing. The connection of painting with the hard line is always evidence of a primitive condition of the art, either simple-minded as in early work, or affected in modern work as an archaic fancy, or continued for decorative reasons.

The earliest painting known to us is that of the ancient Egyptians, a kind of distemper or water-colour with dissolved gum. They had a sufficiently well-supplied palette. White, a light yellow, a duller yellow, light red, dark red, light blue, green, brown, and black appear to have constituted their list. As for the chemical nature of these pigments, pure chalk supplied a white; the Egyptians were acquainted with a vegetable yellow; they were familiar with the ochres; cinnabar was to be had in Ethiopia; their blue was powdered blue glass, itself stained with copper, and when mixed with yellow it supplied a green. Black was easily obtained from animal charcoal and other materials. It is a misunderstanding of Egyptian art to criticise it as a representation of nature; that was rendered impossible by ignorance of perspective and other technical deficiencies. It was intended to be at the same time a record and a decoration, and it effectually answered both purposes. It is much too primitive to be artistic in the modern sense, and in fact the Egyptian painters were not artists but workmen subjected to authoritative direction and to an excessive division of labour. Their drawing was manually skilful, but limited by want of knowledge; their colouring was simply decorative.

The remains of Assyrian painting are much less abundant than those of Egyptian, though it appears from the evidence of travellers that the Assyrians must have painted extensively upon internal wall-surfaces covered with plaster, and also upon tiles built together so as to make more or less extensive compositions. The little that we know of Assyrian and Babylonian painting leads to the conclusion that it was technically not more advanced than that of Egypt, and resembled it in being a record and a decoration rather than an imitation of nature. Outlines were still strongly marked and adhered to, and spaces were coloured flatly, almost as we colour them in heraldic painting. The painting of those early times is, in principle, much the same as that now employed upon playing-cards.

The supreme position of Greece in the art of sculpture has strongly predisposed many critics in favour of her painters, and it has long been believed that if we could see their works we should admire them as we now admire Greek statues of the age of Pericles. There are, however, very good reasons for believing that Greek pictures,

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even by the most famous men, would appear to us still primitive from the pictorial point of view, though it is certain that the drawing of the figures would be elegant and observant. We have no evidence whatever in the classical paintings which have come down to us that the ancients ever mastered the craft of painting in the modern sense—i.e. as an art which interprets truths of effect and which studies not only the *forms* but the *appearances* of nature. The great Greek painters must have been fine linear draughtsmen, and they would colour their drawings carefully; but all Greek art that is known to us has a clear and positive quality incompatible with the richness, the mystery, and the subtle visual truth of painting in its most advanced stages. With regard to the colouring of the Greeks, Sir Joshua Reynolds praised them for having used only four colours, and said that four are sufficient to make every combination required. Sir Joshua probably was thinking of flesh-colour only, which has since been painted by Etty with very few colours. Maclise said of Etty that 'with three colours and white—anything approaching to a yellow, a red, and a blue—he could produce a sweetly-coloured picture.' The Greeks in like manner might colour 'sweetly' with few pigments, but it is not possible to imitate the full colouring of the natural world without a complete palette. Apelles himself could not paint a primrose with yellow ochre, nor a geranium with red ochre, nor is there any means of mixing black and white so as to imitate the azure of a southern sky. It is therefore of the greatest interest to ascertain whether the Greeks had a complete palette or not. Here the difficulty is to know at what date each pigment came into use. The vague expression generally employed is that certain colours were 'known to the ancients.' Of yellows Pliny says that Polygnotus and Micon used yellow ochre only. Vermilion is said to have been 'first prepared by Kallias the Athenian five hundred years before the Christian era,' and minium (red lead) was first used by Nicias, a painter of Athens in the time of Alexander. It is highly probable that the Greeks would be acquainted with Egyptian colours, and the Egyptians knew the madder-root. The Tyrian purple and Egyptian blue were too famous for the Greeks to remain ignorant of them. Yellow and red orpiment were also known to the ancient world. Blue-black made from burnt wine lees was used by Polygnotus and Micon, and ivory black is said to have been employed by Apelles. As for vehicles, there is a well-known passage in Pliny which Sir Joshua Reynolds interpreted as a description of glazing, that is, repainting with transparent colours; but it seems more probable that such accounts as have come down to us mean really no more than varnishing. The use of the word 'atramentum' by Pliny seems to imply that the varnish darkened the picture, which it would do if it were not colourless. It is generally believed now that the works of the Greek painters were executed in distemper and varnished afterwards, except their encaustic pictures, tediously executed with melted colours. Distemper or tempera (the Italian word for the same thing) is a kind of painting in which opaque colours, ground in water, are mixed with any kind of thin glue or white or yolk of egg with vinegar. We believe that the Greeks possessed oils and varnishes, but there is no evidence that they ever practised what we call oil-painting. However, a tempera picture protected by a coat of oil-varnish is distinguishable from an oil-painting only by experts. As to their palette, the probability is that the extremely restricted list of pigments which has been attributed to them was a matter of choice rather than of necessity for conventionally under-coloured work, or they may have begun their paintings with very few colours, as Titian did afterwards, and finished them with a fuller palette.

For a study of Roman painting our materials are much more abundant. We have no important works by famous artists, but there is an ample supply of such ordinary painting as was applied to the decoration of houses and tombs; and from this we may infer at least the technical condition of higher art. The variety of pigments was evidently sufficient to give a full scale of colouring by mixture or superposition, and, as oils and varnishes were known, it might have been possible for oil-painting to arise under the Cæsars. Everything was ready for it as everything was ready for printing, yet the final step was not taken. The art of tempera or size-painting remained technically much what it had been before, except that there may have been greater freedom in execution and in choice of subject. Classical taste in painting continued with a tradition of old methods for a considerable time after the introduction of Christianity, and even when the nude figure was no longer a subject of study tempera painting was still practised, though more stiffly than in classic times. The distance from the painters of Pompeii to mediæval work is marked by more than a technical decline.

In reading histories of painting we may be on our guard against the careless and inaccurate employment of the word 'fresco.' It really means painting on fresh plaster—i.e. on plaster that is still wet; but the word is inaccurately used for paintings on dry plaster also. The practice of painting on walls covered with plaster is as old as ancient Assyria, and it has been believed that the ancient Greeks understood true fresco, principally on the strength of an expression of Plutarch, *eph' hugreois zōgraphein*, 'to paint on a wet ground.' Vitruvius, too, speaks of a wet ground, and, although he does not directly say that it was painted upon *when wet*, he says that, so prepared, it was fit for pictures, and that colours on it are permanent. This permanence of the colours is the characteristic of true fresco. Unfortunately, Plutarch compares painting on the wet with encaustic as evanescence to permanence.

Whatever may be the real antiquity of true fresco, it is certainly a much older process than oil-painting. It was understood and practised in Italy in the middle ages, when mural painting in churches was already in great request. The process is as follows: On the second coat of ordinary mortar is spread a coat of fine old lime mixed with well-sifted river sand. In a few hours (say from three to six, according to temperature) this begins to dry, and the work of painting must be completed before the drying begins, consequently a small surface of plaster is laid at a time. All honest and conscientious fresco-painters, such as Antonio Veneziano, resisted the temptation to retouch on the dry plaster; but the careless or the incompetent could not resist, though such retouching is simply cheating, as it is really not in fresco, and not permanent.

The technical process of fresco was well understood in Italy whilst art itself was still in a primitive condition. Cimabue, Taddeo Gaddi, and Giotto, with many less known men, painted in fresco as well as in tempera, so that all the technical part of the craft was a matter of ancient tradition when Raphael and Michael Angelo took it up on their own account, and brought to it far greater powers of mind. To appreciate the progress made before these great men it is necessary only to refer to the stiff and mindless Byzantine art from which that of Cimabue was already a partial emancipation.

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After the invention of oil-painting the inconveniences of fresco were more strongly felt, and many artists turned away from it to the new process. True fresco cannot be retouched; it has to be painted darker than the artist's intention, as it lightens in drying, and it must be painted from sketches or cartoons. On the other hand, it is luminous and has no gloss, and so is suitable for mural decoration. Raphael seems to have liked fresco and oil equally well. Michael Angelo greatly preferred fresco, as better suited to his powers. Leonardo da Vinci painted his great mural work, 'The Last Supper,' in oil, though fresco must have naturally suggested itself.

Many modern attempts to revive fresco have been made in Europe. They have rarely been successful, and have especially failed in the Houses of Parliament, where many works have decayed prematurely. Modern failures have led to the adoption of a process on dry plaster, fixed afterwards with water-glass in spray, as in Maclise's large works in the Royal Gallery; but this is not absolutely durable. The best substitute for true fresco appears to be Mr Gambier Parry's 'spirit fresco,' employed by Sir Frederick Leighton for his large compositions at South Kensington. These are painted with a spirit medium on dry mortar. In France a substitute for fresco has been found in painting on canvas with a dead surface, the canvas being afterwards fastened to the wall with white lead. True fresco may now be considered almost a dead art.

The next step of importance in the history of art is the discovery, or earliest known practice, of what we call 'oil-painting,' which includes the use of varnishes during the progress of the work. This has been generally assigned to John Van Eyck, who was born about 1390; but it is now believed that his elder brother Hubert may have an equal if not a better claim. Both certainly worked in the new method, and John continued it after his brother's death. Since then the practice of oil-painting and of varnish-painting has been carried without interruption down to our own time, and, though it has undergone much technical development, it remains essentially distinguished from tempera by the mixture of oil or varnish with the colours themselves and by the consequences in execution to which this mixture has led. The brothers Van Eyck themselves were far from anticipating the future freedom and power of oil-painting. Their work was beautifully executed in a smooth and simple way, and, with the exception of small cracks, it has lasted wonderfully; but their careful rendering of detail belongs to the infancy of art. An Italian student of painting, Antonello da Messina, stayed in Flanders for some time and worked under John Van Eyck. He afterwards returned to Italy by way of Venice, and from him the knowledge of the new method spread to Florence, and thence to the other cities of Italy. The date of Antonello's death, which occurred in Venice, is not precisely known, but appears to have been in the last years of the 15th century.

It may be convenient to remember that the year 1500 saw the practice of oil-painting firmly established in the north and south of Europe. It did not immediately win the absolute pre-eminence that it has subsequently attained. Michael Angelo expressed a contempt for it which was probably due to the fact that its full powers were not yet developed by his neighbours. The fame of Raphael as an artist is due to other qualities than the technical merit of his oil-painting, which remained comparatively primitive. The earliest practice of oil-painting was dependent upon the luminous quality of the ground showing through the colours; and, although the early oil-painters manifested a workman-like skill in dealing with their materials, they displayed no power of handling. The manual precision of Albert Dürer has never been surpassed, yet his work as a painter is primitive. Roman painters of the time of Michael Angelo might use oil as a convenience, but they could have expressed themselves as completely in fresco or tempera. When we come to the Venetian school the case is very different. There was a harmony between the technical methods of oil and the genius of the Venetians which led to the highest technical excellence. Van Eyck and his followers, both in Flanders and Italy, painted upon a transparent monochrome. Titian used a substantial dead-colouring in which he could make whatever alterations he chose, and afterwards worked upon that by successive glazings till he obtained the utmost richness of quality. The notion that Titian had some secret that died with him may be dismissed as purely fanciful. His method of painting is well known, and his superiority to his imitators may be accounted for by his natural genius and by favourable circumstances. His master, Bellini, drew carefully and coloured well, but his work is still primitive, because it is still coloured drawing. In Titian's painting the different kinds of technical knowledge are so completely fused together that he is not the draughtsman who colours, but the *painter*. The same is true of Giorgione, almost equally gifted, but less favoured than Titian in the circumstances of his life.

Rubens was a great master of the *technique* of painting in another way. He painted much in transparent or semi-transparent colours over a first painting in transparent brown monochrome; but, instead of leaving the lights thin that the white ground might show through as in the practice of the early Flemish painters, Rubens loaded his lights with thick opaque colour. His way of painting was technically very systematic, which permitted an extreme rapidity. There is evidence that he followed the early practice of mixing varnish with his colours, at least when transparent and for linear sketching with the brush. The technical execution of Velasquez is a model of excellence in the use of both transparent and opaque colours and in variety of handling. It is not so methodical as that of Rubens, being always subordinated to the artistic intention of the painter.

The most perfect works on a small scale have hitherto been those of the Dutch painters, Teniers, Terburg, Metsu (or Metzu), Maas, Peter de Hooch, and many others of the same school. Their method of painting was almost universally to begin with a transparent brown monochrome on which they painted the shadows thinly, giving more substance and opacity to the lights. Being limited in their aims, and painting chiefly what they could see around them and study at their own convenience, they attained a high degree of technical excellence. Their drawing is almost invariably careful and true, and their colouring harmonious, whilst the quality of their textures is often inimitable.

The practice of modern artists is always founded upon that of one or other of the masters we have mentioned. There are not very many ways of painting, or if they seem to be many they are reducible to a few very simple principles. The early method of giving luminous quality to the lights by letting the white ground show through them is seldom followed in these days, but it has been resorted to occasionally. The practice of Rubens, by which the shadows are painted thinly and the lights more thickly, is much commoner in the modern schools. Reynolds, who painted first a strong dead-colour with few colours and glazed upon it afterwards, worked on the principle of Titian. Landseer's

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practice was essentially that of the Flemish school, and Meissonier's (in his best works) that of the Dutch. Turner approached much more nearly to the Venetian practice than to that of Rubens, as he dead-coloured broadly and afterwards painted in detail on the dead-colour, using glazes and scumbles (opaque colour used thinly); but Turner's practice was complex, as he often had recourse to water-colour in his oil-pictures, and finally loaded his lights. Ingres, the leader of the classical French school, was a close follower of Raphael. It is difficult to point to any real technical originality in modern art, unless it be the use of thick pigments in the French school (called in French, *pleine pâte*) introduced by Decamps, and often exaggerated by his imitators. The novelty here was, however, rather in the brush-work than in the use of thick pigments themselves. Many French artists have also blurred their outlines in revolt against the clear definition of the classical school, but the originality was rather in the manner of doing it than in the mere softening of the outlines, as Titian, Correggio, Reynolds, and others had already carefully avoided the early hardness of definition.

Although the technical methods of oil-painting are few and have now been known for centuries, the varieties of *quality* which result from individual genius are almost as numerous as artists themselves. They cannot be explained without examples; but it may be said generally that, as different violinists elicit different qualities of tone from the same instrument, so the idiosyncrasy of painters produces new results with old colours and old processes. It is in this way, and not by the invention of novel methods, that the art continually renovates itself.

Oil-painting now holds the first place on account of its convenience, as it permits of infinite deliberation and alteration, and also on account of its great power and truth in imitating the textures and tones of nature. But the true successor of fresco in modern times is water-colour. It resembles fresco very closely by its rapidity and by the absence of gloss, though it cannot replace fresco in mural decoration. Water-colour, as a process, is much more ancient than oil, having been extensively employed in various ways during ancient and mediæval times; but the method of using it that gives the process its present intellectual value is essentially modern and English, dating from the early years of the 19th century. The practice of the 18th century led up to it by the use of broad washes in sepia or in neutral tint, afterwards more or less coloured, an adaptation of the Dutch and Flemish practice in oil-painting, except that the finished result stopped very far short of full colour. The water-colour of the present day has discarded the monochrome wash, beginning with pale washes in colour, and working from light to dark. In its perfection modern water-colour is distinguished by extreme freshness and brilliancy. It is important not only as an independent art, but by its great influence on modern oil-painting. The majority of oil-painters have themselves employed water-colour as an auxiliary for studies, especially in landscape, and much of the light and air in modern oil-painting may be attributed to its influence. Water-colour, in our own century, has proved a compensation for our failure in the attempted revival of fresco. Though apparently of inferior importance, because practised on a small scale, it has taught what fresco taught and more, as it has educated us in landscape. Improvements in the materials of water-colour have led some of its practitioners to attempt rivalry with the force of oil, which is unnecessary, as oil must ever remain the more powerful medium of the two, and water-colour has its own superiorities in freshness and delicacy. There does not seem to be any probability that either of the two arts will ever be replaced by a new discovery as tempera was superseded by oil, nor is it likely that the technical methods will be improved. There is room for improvement in a stricter abstinence from the use of evanescent or destructive colours; but unfortunately very few artists trouble themselves to secure the permanence of their works.

Water-colour was despised in France until the fall of the second empire; but the example of English artists has led the French to the study of it, and now many of them pursue it with success. Their methods of work are usually very simple and direct, and their influence is almost exclusively in favour of freshness and decision.

(2) *The Intellectual History of Painting.*—Under the Egyptian dynasties painters were recorders of events and decorators; in Assyria they illuminated a sort of pictorial history of royal deeds. In both these cases there could be very little room for the exercise of individual intellect in the artist, who was seldom more than a manual workman, laying on colour according to methods prescribed for him by authority. Even in Greece we have evidence that the manual skill of artists was despised as handicraft by the class of gentlemen and scholars; however, Greek painters of eminence attained individual distinction, and such a complete degree of personal emancipation that they were free to exercise whatever intellectual power they possessed. There is not much expression in Greek sculpture, but there is some, and what there is proves quite sufficiently that the subtle and acute intellect of Greece could express itself in art as effectually as in literature. What remains to us of Greek and Roman caricature is good evidence of faculties that might have exercised themselves, by an alliance with a higher form of art, in what we now call genre-painting. Still, we have no direct proof that the fine arts in Greece ever really were intellectually so great as her poetry, her philosophy, and her drama. In the decline of classical art we find little more than the current production of an inferior class of men for the adornment of habitations or tombs. The beginnings of Christian art, stiff in design and laboriously ornamental, give hardly any evidence of intellect; the artists who produced that art were in a condition of mental servitude, like that of the men who now manufacture holy icons in Russia, and who are the direct descendants of the early Byzantine school. As the fine arts became gradually emancipated from the thraldom of sacerdotal authority intellectual power began to show itself, and, at length, when the human mind was stimulated in so many directions by the great outburst of the Renaissance, the art of painting had its full share in the general activity, and assumed a place by the side of literature which it has ever since maintained. Nevertheless, the necessity for high manual accomplishment and technical mastery must always, in painting, give an advantage to the workman over the thinker; and so we find, as in many Dutch pictures, that clever representations of the most commonplace subjects preserve their value though almost destitute of mind. There can be no more striking contrast than that between a Dutchman toiling for six weeks on the representation of a besom and Michael Angelo painting a prophet in half a day; yet the Dutchman is immortal too. The intellectual progress of art has been marked by the extension of its sympathies. Under Christianity the art of painting began again from the beginning, without either technical or intellectual preparation. Its first awakening of sympathy is with the human side of Christianity, the love of mother and child, the sufferings of the crucified Christ, the sorrow and bereavement of the disciples. As religious art

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advances, its mental progress is shown by the increasing importance given to the human side of its subjects and the diminution of ornament in dress, till at length the dresses become simple draperies, almost without jewels or embroidery, and the charm of the work lies in the beauty or nobility of the faces and the dignity of the attitudes. With the Italian Renaissance the art of painting made a great intellectual advance by its sympathy with what was then the new activity of scholarship. Raphael was, if not himself a scholar, the intimate friend of scholars, working constantly under their influence; besides which he was an architect and an archæologist. The selection of 'The School of Athens' as the subject of one of the most important mural pictures in the Vatican is most significant. In Leonardo da Vinci the artistic is united to the scientific intellect; in Rubens it is united to the broadest culture of the scholar and the man of the world. Rembrandt may not have been a learned man, but few authors or artists have shown more sympathy with different classes, or have discerned so well the dignity that may belong to the learned or the unlearned, to the rich or the poor. The pictures and etchings of biblical subjects by Rembrandt bring them nearer to us by their homely truth than the ideal conceptions of Raphael. Surely we cannot refuse the title 'intellectual' to an art which contains a philosophy at once so comprehensive and so ripe. The faculties of Teniers and Ostade are narrower and lower, yet even in their works there is a sympathy with the humbler classes which has lasted down to the art of our own day, which was lively in the art of Wilkie, and is graver and more profound in the work of Israels.

All portrait-painting of any importance has endeavoured not only to copy the features, but to express as much as possible of the mind; and the knowledge we derive from historians and biographers is felt to be incomplete until we have referred to the canvases of some observant contemporary artist, some Holbein, Van Dyck, Velasquez, Reynolds, or Raeburn. Even in these days of photographic invention the portrait-painter keeps his place, great portraits are painted still, and future students of history will not be satisfied with the photograph alone, but will go for the intellectual element to the canvases of a Millais or a Bonnat. Closely connected with portraiture is the art which observes and records the passing phases of social life, an art which reached perfection in the 18th century in the strongly characterised and too truthful pictures of Hogarth. The representation of contemporary life, in drawing-rooms and elsewhere, has been actively pursued down to our own day in all the leading schools of Europe, and is now practised more than ever, especially in France, where the artists are tempted by the elegance of modern interiors and the grace of feminine costumes.

In the 19th century there has also been much retrospective painting, particularly of the 18th century, and this has led to a very close and minute study of that century by Leslie in England, Meissonier and Gérôme in France, and many other artists of ability. The retrospective tendency of our own time has been strongly manifested in other ways. The modern interest in the past has been shown by much 'historical' painting on insufficient data representing personages whose portraits we do not possess, in buildings that have left no trace, and engaged in actions known to us only by the meagre narrative of some chronicler. Art of this kind possesses no real historical interest, though it may display considerable artistic ability. Of late years it has been in a great measure superseded by archæological painting, skilfully practised by Mr Alma Tadema and his followers, whose object is to revive the past for us in its details as it really was by representing everyday life without much pretence to the portraiture of individuals or the recording of particular events. This kind of painting has brought the art nearer than ever to the spirit of scholarship. No doubt the special interest of it is outside of artistic interest, but there is no reason why archæological pictures should not be as beautifully drawn, as well composed, and as richly coloured as any others.

A sketch of the history of painting would not be complete without some notice of the way in which landscape became a speciality. Rude and childish landscape backgrounds are found even in Assyrian art, they are not uncommon in Greek and Roman antiquity, and they attained a considerable degree of freedom and observation in the backgrounds of the paintings at Pompeii. After the death of classic art, painting began again from its first rudiments in the ornamental art of the middle ages, and the study of landscape soon revived in the backgrounds of religious pictures. Mediæval landscape lasted down to Raphael, who was himself essentially a mediæval landscape-painter, especially in his early works. The general characteristics of that kind of landscape are clear atmosphere, pure skies, either cloudless or with a few white clouds, pale blue distances with hills, green foregrounds, and almost invariably one or more well-kept buildings. Trees in the foreground are usually slender, with thin twigs and few leaves visible almost separately against the sky; in the distance they may be more massive. Water is usually calm in ponds or winding rivers, or serene in distant sea. Rocks occur in mediæval landscape, but are seldom accurately represented, the mediæval ignorance of rocks having even persisted in Leonardo da Vinci notwithstanding his scientific genius. In the backgrounds of Albert Dürer all kinds of objects are observed and set down as in a catalogue; he perceived the grandeur of mountains, the abundance of forest trees, the picturesque beauty of mediæval towns, and he took an interest in all the details of the foreground; but he never fused his details into one connected whole; he never saw nature with the eye of a landscape-painter; he had no sense of atmosphere or effect. The beginning of the modern landscape spirit is to be sought for in Venice. Titian made many studies of landscape, and, although in his pen-drawings there is no recognition of local colour and very little effect, there is a remarkable sense of grandeur and a fine grasp of noble scenery, not in detail merely, but as a whole. In his painted landscape backgrounds Titian goes still further and attempts transient effects, showing himself a true precursor of the modern landscape-painters. Tintoretto occasionally exercised his magnificent powers in the same direction. The most influential of professed landscape-painters was Claude. He had not the power of the Venetians, but he had a tenderness and charm, and a sense of grace and beauty, that won the hearts of contemporaries and have since maintained the celebrity of his name, though it is easy for criticism to point out deficiencies of knowledge. Unlike Dürer, Claude saw nature, not in details, but synthetically in complete pictures full of atmosphere and light. Salvator Rosa and Gaspard Dughet (or Poussin) maintained a grandeur of conception and style in landscape which, in spite of a certain remoteness from pure nature, tell effectually in picture-galleries even at the present day.

The same may be said of Gainsborough, whilst Wilson perpetuated in England a feeling for landscape akin to the amenity of Claude. Cozens and Girtin had the old breadth and serenity of conception, with a more modern view of nature, and

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Turner did not manifest much personal independence until he had first studied and imitated the old masters, particularly Claude. Indeed, he is much more closely connected with the past than with the future of landscape-painting. He had the deepest respect for the older masters, whom he both studied and imitated, yet he founded no school and has had little influence on the art of England and none on that of continental Europe. Constable, on the other hand, who during his lifetime was a less celebrated artist, has had a very far-reaching influence. The freshness and originality of his view of nature, less poetical and imaginative than Turner's, but nearer to rustic reality, determined the future direction of that French rustic school which in its turn has influenced all the schools of Europe. Whilst England has had her poet landscape-painter in Turner, France has had hers in Corot, a painter of at least equal celebrity, though of much narrower range. Like Turner, Corot founded his art on the study of Claude, but won public favour late in life by a delicacy of sentiment which was his own. His subjects were simple and his effects chosen so as to avoid strong colouring, but he composed beautifully and was a master of quiet grays, pale yellows, and browns.

Since the middle of the 19th century landscape-painting, both in oil and water-colour, has been actively pursued all over Europe. Every class of scenery has found its interpreters. Scotland has been painted effectively by Horatio MacCulloch, Sam Bough, Mr Peter Graham, Mr Colin Hunter, and many others. A severely accurate and scientific spirit was imported into English landscape by Mr Cooke and Mr Brett. The French landscape of the present day is usually marked by simplicity of subject, breadth of treatment, and truth of tone, without much accuracy of detail. Marine painters in all countries appear to concentrate their attention more than their predecessors upon the sea itself, and both English, French, and American artists have produced remarkable studies of waves.

A sketch of the history of painting seems to require a brief outline of the sects which have divided artists. The chief of these have been the Classics, the Romantics, the Realists, the Pre-Raphaelites, and the Impressionists. The classical aim was the pursuit of the ideal, which was believed to be *one* and to have been attained by Raphael; this school was represented by the French painter Ingres. The Romantics desired freedom from the classical restraint, and liberty to illustrate all literature and all history that interested them in their own way; their great man was Eugène Delacroix. The doctrine of the Realists is the right to represent persons and things as they are without beautifying them by idealisation. This doctrine was at one time represented by the French painter Courbet; but, in fact, there was a great deal of downright realism long before his time, as we find it in Velasquez, Rembrandt, Teniers, Ostade, Hogarth, and many others, who have redeemed the ugliness of a subject by the intelligence of their treatment and the force of their execution. Even in the case of Courbet himself we now easily see that, although he affected to take nature exactly as it is, he displayed the wilfulness and the style of an artist. English Pre-Raphaelitism was not alone in its return to the painstaking imitation of detail which marked the practice of Raphael's predecessors. Like the continental movements in the same direction, it was a return to patient analysis, and had a disciplinary value; but the accumulation of artistic experience was too much for it. After Titian, Velasquez, and Reynolds, it is not possible to bind down the art of painting permanently to the minute practice of the early masters. Intellectually the movement was of more importance, as it favoured the choice of noble subjects. Impressionism asserts the importance of visual truth as opposed to mere truth of fact, and affirms that painting ought not to represent what *is*, but what *appears*. Impressionism is also opposed to the abstract rendering of this or that quality; it requires a synthesis of all visible qualities as they strike the eye together. The Impressionists claim several great artists, especially Turner and Constable, as their predecessors. They are equally opposed to the detail of the minute painters and to the hard, clear, linear definition of the classical schools. There can be no doubt that theoretically they have right on their side, but in practice their art is often unsatisfactory, as it requires the happiest and most rapid sketching to be successful, with great certainty in selection and perfect truth of tone.

The present state of the art of painting is one of complete freedom from all the former restraints of religious or classical authority. The fine arts are as free as the sciences, and, although less exclusively devoted than men of science to the pursuit of natural truth, contemporary painters at least refer to nature for everything. The consequence is a pervading freshness in the modern schools, and it is also certain that manual skill has never been so general as it is now. On the other hand, the intensity of the commercial struggle amongst the great multitude of artists is certainly not favourable either to learning or to refinement, and it is doubtful whether painting makes any advance in taste and culture corresponding to the increase of its productiveness or the extension of its fields of study.

Chronology.—The extent of the subject renders laconic treatment necessary. Archaic Greek drawing, marked by want of proportion, especially in thickness of limbs, lasts in vase-painting throughout the 6th century B.C. and later. In 5th century better drawing on many vases; in 4th century it is often learned and beautiful, as on Camirus vase (British Museum), contemporary with Protogenes. Attitudes then easy and graceful, faces shown in all positions; 5th and 4th centuries B.C. golden age of antique painting, including Apollodorus, Zeuxis, Parrhasius, Apelles, Polygnotus, and Micon. Romans imported Greek pictures and took up painting by imitation. Roman painter Ludius (Augustan age) anticipated Claude in choice of subjects. Paintings preserved at Herculaneum and Pompeii, and in baths of Titus, belong nearly to Christian era, some earlier, others a few years later. Pompeian painting shows interest in ordinary life and in landscape. Classical art is, in feeling and principle, prolonged for six centuries in the service of Christianity.

The middle ages are divided by Woltmann into (1) Early, from 700 to 950 A.D.; (2) Romanesque, from 950 to 1250 A.D.; (3) Gothic, from 1250 to 1400 A.D. Thus the three periods are 250, 300, and 150 years. Throughout these ages, speaking generally, the human motive of art is religious, and its artistic motive is ornament. In the middle ages figure design began again from a barbarous infancy, it being necessary for the representation of religious personages. From 8th to 13th century childish drawing and gaudy colouring prevailed throughout Europe. In 13th some partial improvement takes place, and in 14th the advance is remarkable when Claes Sluter carved his life-like statues. Brothers Van Eyck (q.v.) born in this century.

The 15th century is the time of transition from the art of the middle ages to an improved craft of drawing and painting preparatory to the Renaissance. Improvement simultaneous in Flanders and Italy. Van Eyck's work known in southern Europe, his influence only technical, and soon died out in Flanders itself. Roger van der Weyden

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(died 1464) worked differently, having stayed in Italy and exercised much influence in Flanders and Germany. His pupil, Hans Memling, died 1495.

The 16th century is remarkable for its extension of the subject-matter of painting. Before 1500 the art is chiefly confined to religious subjects and portraits, afterwards it includes more of what we now call genre—a change associated with the name of Quentin Massys (1466–1530). The nude introduced into Flemish art from Italy by Jan Gossart (died 1532). After this date Flemish painters went much to Italy, which produced a hybrid school called the 'Italianised Flemings'—e.g. Michael Coxis (1499–1592), spent many years in Italy. The first Flemish school, now at an end, was influential in Germany; Roger van der Weyden had German pupils. Cologne and Nuremberg were active centres. Martin Schongauer lived in Rhineland in the 15th century. Hans Holbein the elder, of Augsburg, lived in 15th and 16th centuries. His famous son, Hans (1498–1543), represents the perfection of German realism in portrait. Albert Dürer (1471–1528) stands for Germany, coming out of, but not yet delivered from, the middle ages. His contemporary, Lucas Cranach (1472–1553), was like Dürer, laborious and productive. Dürer visited Venice 1506, and was admired for his skill (particularly by Giovanni Bellini), but had little influence. German hardness and minuteness of finish culminated in the comparatively mindless art of Denner (1685–1747).

Italian painting is minutely divided into local schools, and these again chronologically into three or four stages of development. Masters of 14th century divided into Tuscans, Sienese, Bolognese, Paduan, and Neapolitan; those of the 15th into Tuscan, Umbrian, Paduan, Veronese, Milanese, Venetian; those of the 16th are headed by the well-known great individualities. The schools affect each other—e.g. it is difficult to disengage Roman and Florentine art, whilst the Umbrian school gave strength to Rome. The following list gives the most famous names.

14th Century—Tuscans.—Giotto (1276–1336), Taddeo Gaddi (1300–66), Orcagna (died before 1376). *Sienese.*—Duccio (still living in 1339), Angelico (1387–1455).

15th Century—Tuscans.—Paolo Uccello (*c.* 1400–79), Masaccio (1402–28), Filippo Lippi (1412–69), Ghirlandajo (1449–98). *Umbrians.*—Pietro della Francesca (living 1494), Giovanni Santi (died 1594), Pietro Perugino (1446–1524). *Bolognese.*—Francia (1450–1517). *Paduans.*—Andrea Mantegna (1431–1506). *Venetians.*—Antonello da Messina (1414–93), Gentile Bellini (1421–1507), Giovanni Bellini (1426–1516).

16th Century—The Great Masters.—Leonardo da Vinci (1452–1519), Michael Angelo (1475–1563), Raphael (1483–1520), Correggio (1494–1534), Giorgione (1478–1511), Titian (1477–1576), Tintoret (1512–94), Paul Veronese (1530–88). Other Italians of eminent, but not of supreme, rank in the 16th century are Luini (living 1500–30), Volterra (1509–66), Andrea del Sarto (1488–1530), Sebastiano del Piombo (*c.* 1485–1547), Palma Vecchio (*c.* 1480–1528), Moroni (*c.* 1525–78).

In the north of Europe there was a new development occupying the 17th century. In the year 1600 Rubens was an accomplished artist (died 1640). Snyders (1579–1637) his most powerful contemporary, and Van Dyck (1599–1641) his most eminent scholar. David Teniers, the father (1582–1649), was eclipsed by David Teniers, the son (1610–94); the latter gave genre-painting a firm position. Gonzales Coques (1614–84) was a portrait-painter. Passing to Holland we find Frans Hals, a contemporary of the elder Teniers (1584–1666), and a painter of remarkable certainty and spirit. The greatest of the Dutchmen, Rembrandt, belonged entirely to the 17th century (1607–69). The fame of Rembrandt has greatly increased during the 19th century, and so has that of Frans Hals. Rembrandt had distinguished pupils, like Dow and Flinck, and he influenced many artists. Terburg, genre-painter, was Rembrandt's contemporary (1608–81), also Metsu (1615–58). These carried genre-painting to perfection. Landscape also prospered in Rembrandt's time, chief representatives being Ruisdael (*c.* 1628–82) and Hobbema.

In Spain a primitive school was founded as early as 1450. In the 16th century local schools developed themselves. Eminent foreign artists visited Spain and worked there, as in England. Of the Spaniards themselves, few have become celebrated out of their own country. Ford's list includes only thirty-seven names; the National Gallery only seven, and of these one was a Greek. Only five Spanish artists are represented in the Louvre. The fame of the school is due almost entirely to Velasquez (1599–1660) and Murillo (1616–82). Next to these come Zurbaran (1598–1662) and Ribera (1588–1656); Morales (*c.* 1509–86) is also known. Goya (1746–1828) is the only great Spanish artist between the old masters and our contemporaries.

The French school before developing a character decidedly of its own was subject to foreign, chiefly Italian influences, especially after the Renaissance. François Clouet (*c.* 1500–72), one of the earliest French masters, was naturalised, and probably of Flemish origin, like his accurate method of work; Jean Cousin (1500–89) worked under Italian influence; Vouet (1590–1649) studied, lived, and married in Italy; the great Poussin (1594–1665) lived nearly forty years in Rome, and died there; Claude le Lorrain (1600–82) lived fifty-five years in Rome, where he, too, died; Lesueur (1617–55) refused to go to Rome, but was influenced by Raphael; Le Brun (1619–90) studied four years in Rome, like other eminent Frenchmen since his time. The following artists are essentially French: Rigaud (1659–1743), Watteau (1684–1721), Lancret (1690–1743), Chardin (1699–1779), Boucher (1704–70), Greuze (1725–1805), Fragonard (1732–1806), Prud'hon (1758–1823).

In the British school the seven names which follow are at the same time distinctly national, and generally recognised by continental criticism. They occupy in this respect a position similar to that of the few Spanish masters who are generally known: Hogarth (1697–1764), Reynolds (1723–92), Gainsborough (1727–88), Turner (1775–1851), Constable (1776–1837), Wilkie (1785–1841), Landseer (1802–73).

The peculiarity of the present situation is that all schools have turned away from their national ancestry. The modern Italians go straight to nature, and paint it as if they had no art behind them. The modern Dutch have no connection with the great Dutchmen of the 17th century. Spaniards of the school of Fortuny are as remote as Americans from Velasquez. French landscape has nothing to do with Claude. Leighton is not a descendant of Reynolds. We find everywhere that the national artistic ancestry counts for little or nothing. The localisation of styles has to be done anew by criticism for the close of the 19th century, and it is complicated by the free choice everywhere made amongst past examples. Ribot is nearer to Ribera than to any Frenchman. Paris has become the capital of the art of painting. The clever and promising American school is as yet an offshoot from the French; and the northern European nations send their art-students to Paris as once they went to Rome. Schools are no longer national, the art has become cosmopolitan to a degree impossible for literature.

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Technical Chronology.—400 B.C., white-lead of this date has been found at Athens; 1398 A.D., Indian ink prepared in China as now; 1350–1400, true fresco used in Italy; 1500, oil-painting generally adopted; 1710, Prussian blue discovered by Diesbach of Berlin; 1787, zinc white suggested by Courtois of Dijon; 1802, Thénard discovers cobalt blue; 1814, discovery of emerald green; 1814, first discovery of existence of artificial ultramarine, and prize offered for its manufacture soon afterwards won by Guimet of Lyons; 1814, cappagh brown found on Lord Audley's estate; 1817, cadmium discovered by Stromeyer; 1834, zinc white prepared by Winsor and Newton as Chinese white; 1838, discovery of chromium green by Pannetier and Binet; 1850, water-glass painting introduced. Of the ten colours chosen for permanence in Professor Church's restricted palette six have been discovered during the 19th century.

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Paisiello, GIOVANNI (1741–1816), a Neapolitan composer, whose best-known work is the charming opera *Il Barbiere di Seviglia* (not to be confounded with Rossini's). Besides more than ninety operas, Paisiello composed over a hundred masses, requiems, cantatas, and numerous instrumental pieces.

Paisley, a busy manufacturing town of Renfrewshire, stands, backed by the Braes of Gleniffer (749 feet), on the White Cart, 3 miles above its influx to the Clyde, 7 WSW. of Glasgow and 16 ESE. of Greenock. Although commonly identified with the *Vanduara* or *Vindogara* of Ptolemy, which Skene places rather at Loudoun Hill in Ayrshire, it first is heard of certainly about 1157 as *Passeleth*, a possession of Walter Fitzalan, the first Scottish ancestor of the royal Stewarts (q.v.). He six years later founded here a Clugniac priory, which was dedicated to SS. James, Mirin, and Milburga, and which in 1219 was raised to the rank of an abbey. It was burned by the English in 1307; suffered much at the Reformation in 1561, and still more by subsequent vandalism; and now is represented chiefly by the aisled Decorated nave (15th century: the Abbey parish church, restored since 1862), and by the chapel of St Mirin, called the 'Sounding Aisle' (1499), with the altar-tomb of Marjory Bruce. Near the abbey are statues of Wilson the ornithologist and Tannahill, who, like Professor Wilson ('Christopher North'), were natives of Paisley. There are also fine statues of George A. Clark, founder of the town-hall, and (since 1891) of Sir Peter and Thomas Coats. Motherwell and Alexander Smith were residents; and the latter describes the town well in *Alfred Hagart's Household*. Elderslie, 2 miles W., is the traditional birthplace of Wallace.

The public edifices include the municipal (formerly county) buildings (1818); new sheriff court-house (1885); the fine Clark town-hall, Italian in style, and built in 1879–82 at a cost of £110,000; the new county buildings (1891), containing one of the finest council halls in Scotland; the Coats free library and museum (1871), with a picture-gallery and an observatory; the grammar-school (1576; rebuilt 1864); and the Neilson educational institution (1852). The Coats Memorial Baptist Church (1891) is, it is claimed, the finest ecclesiastical edifice built in Scotland since the Reformation, having cost £100,000. The Fountain Gardens (1868), the Brodie Park (1877), and St James's Park, round which is the racecourse, have an area respectively of 6, 22, and 40 acres.

The linen, lawn, and silk-gauze industries, important during the 18th century, are now extinct; as, too, are the 'Paisley shawls,' so celebrated between 1805, and the middle of the century, their sale sometimes exceeding £1,000,000 per annum. The manufacture of linen sewing-thread, introduced in 1722 by the witch-denouncer Christian Shaw of Bargarran, has been nearly superseded since 1812 by that of cotton thread, which has assumed gigantic proportions, the two principal firms now employing about 10,000 hands between them. There are also works for dyeing, bleaching, tartans, woollen shawls, carpets, distilling and brewing, chemicals, starch, corn-flour, preserves, engineering, &c., besides shipbuilding-yards. The Cart since 1786 has been rendered navigable, its water-way being finally deepened to 18 feet in 1888–90; and water-works (1834–90) furnish 6,000,000 gallons per diem to Paisley and Johnstone. Paisley was made a free burgh of barony in 1488, the fourth centenary of that event in 1888 being graced by the presence of Queen Victoria, who afterwards placed a memorial of the Stewarts in the ruined choir of the abbey. Since 1833 it has returned one member to parliament. In 1843 the corporation had to suspend payment, nor was the burgh clear of debt until 1877. Pop. (1801) 24,324; (1841) 48,125; (1881) 55,627; (1891) 66,427.

See Cosmo Innes' *Registrum Monasterii de Passelet* (Maitland Club, 1832), two works by Semple (1872–74), Dr Cameron Lees' *Abbey of Paisley* (1878), and Robert Brown's *History of Paisley* (2 vols. 1886).

Pakhoi, a seaport of China, opened to foreign trade in 1876, stands on the northern shore of the Gulf of Tonking. The harbour is shallow. Trade does not flourish. The imports—cottons, woollens, opium, rice—average £809,700 per annum; the exports—tin, sugar, indigo, aniseed, hides, ground-nut oil—£229,700. Pop. 25,000.

Palacky, FRANCIS, a Bohemian historian, was born 14th June 1798, at Hodoslavitz, in Moravia, and studied at Presburg and Vienna. In 1829 he was appointed historiographer of Bohemia, and was charged to write a *History of the Bohemian People to 1526* (5 vols. 1836–67), which appeared in both German and Bohemian; it is one of the greatest literary works in the Bohemian tongue, and nationalist through and through. Palacky took part in the political agitation of 1848, and was the leader of the Slav or national party as opposed to the German at the Diet of the Kremsier. Besides his great *History* he published works dealing with the Hussite period, and with Schafarik edited *The Oldest Memorials of the Bohemian Language* (1840). He died 26th June 1876 at Prague.

Palæography is the science which deals with ancient manuscripts, teaching us not only to

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decipher them, but to judge of their date, genuineness, and place of origin. While Epigraphy (see the article INSCRIPTIONS) is concerned with writings engraved on some hard substance, such as stone or metal, the materials for palæographic study comprise ancient books, either rolls, *volumina*, written on leather or papyrus, or *codices*, written in book form on sheets of vellum or paper. Wax-tablets, charters, bulls, decrees, acts, business papers, and similar documents have also to be considered by the student of palæography.

The oldest extant manuscripts come from Egyptian tombs, and are written on sheets of Papyrus (q.v.), prepared from the pith of a rush. A few fragments date from the time of the early empire, the most important being the *Papyrus Prisse*, the oldest book in the world, which was found in a tomb of the 11th dynasty, and must therefore be older by several centuries than the Hebrew Exodus. Coming down to the 18th and 19th dynasties, papyrus rolls, usually containing portions of the Book of the Dead (q.v.), are numerous. But documents written on papyrus, a very fragile material, have mostly perished, and the chief ancient MSS. which have come down to us are written either on parchment, which is still used for legal documents, or on vellum; the skins being prepared so as to be written on both sides, thus superseding the older leather rolls, still used in Jewish synagogues for copies of the Law. The necessary limits of this article make it impossible to discuss the hieratic and demotic papyri from Egyptian tombs, or any of the Eastern scripts, Chinese, Pali, Indian, Coptic, Syriac, Hebrew, or even the magnificent specimens of Persian and Arabic calligraphy preserved in oriental libraries. The student may, however, be referred to the oriental series of the Palæographical Society, to Silvestre's *Paléographie Universelle*, and Burnell's *Elements of South Indian Palæography*. It must here suffice to describe briefly the Greek and Latin styles, and the more important of the mediæval scripts.

Both in Greek and Latin manuscripts we find two contemporaneous but widely-different styles of writing; a book-hand, formal and stiff, but legible, used by professional scribes, and a cursive hand, rapid, careless, loose, and straggling, often very difficult to read, which was employed for private correspondence, contracts, accounts, and, somewhat formalised, for charters, rescripts, and other official documents.

The book-hands may be classed as Capital, Uncial, or Minuscule. The capitals, which differ little from the lapidary forms used in inscriptions, are square and angular, such as are still retained for initials, titles, and superscriptions. Manuscripts written wholly in capitals are very rare, the use of more facile materials, such as parchment or papyrus, having led at a very early time to modifications of the lapidary forms, transforming them into uncials, a formal book-hand, large, clear, and legible, used by professional scribes for codices, and derived from the capitals with little change, save that the forms are more rounded, and often inclined rather than upright. Thus, Є both in Greek and Latin is a characteristic uncial form, obtained by rounding the capital form E, and saving labour by requiring only two strokes of the pen instead of four. The term Uncial is as old as the time of St Jerome, but its modern usage is due to a misconception, uncial letters being seldom an inch in height, as the name implies. The general resemblance in the character of Greek and Latin uncials will be seen by a few words from St John, xxi. 19, as they appear in the *Codex Bezæ* at Cambridge, a manuscript assigned to the 6th century, containing the Gospels and Acts in Greek, with the Vulgate translation.

Greek.

Latin.

Or, in ordinary minuscules, σημερων [σημαινων] τωι θανατωι δοξασει τον Θεον, 'significans qua morte honorificabit Deum.'

In the 8th and 9th centuries a new book-hand was evolved mainly out of the cursive, but incorporating sundry forms from the degenerate contemporary uncial. This, by reason of the smaller size of the letters, is called minuscule. The old majuscule cursive, developed out of the capitals and uncials, which had by this time become formless and illegible, was gradually superseded by a new cursive, developed out of the minuscule. The minuscule reached its perfection as a book-hand in the 11th century, after which it continually degenerated till the invention of printing. Both for Greek and Latin books the early printers adopted at first the corrupted forms of the contemporary book-hands, but afterwards returned to the older and purer types of the 11th and 12th centuries. Thus there is a general analogy between the successive stages of Greek and Latin writing. Side by side with the old cursive scripts there is a gradual evolution of improved uncial book-hands till about the 4th century, followed by a period of decay, till the 9th century, when the revival of learning produced a regeneration, again followed by progressive deterioration till the invention of printing caused a reversion to the best of all preceding styles, that of the 11th century. Traces of these revolutions may still be recognised. It will be observed that we now employ four different alphabets: minuscules for our printed books, and capitals for their title-pages, headings, and initials, and cursives for our correspondence, while the initials in our ordinary writing are analogous to uncials. Familiarity prevents us from noting the wide differences in the forms of such letters as A, a, *a*; B, b, *b*; G, g, *g*; or R, r, *r*. These are survivals, the first from the lapidary capitals of the Augustan age, the second from the French book-hand of the 11th century, and the third from the Tudor cursive, modified and improved by the Italian cursive of the Elizabethan age.

Greek Palæography.—No Greek manuscripts written in pure capitals have come down to us, though the transitional forms may be detected. The oldest Greek manuscripts now extant are papyri in early uncials of the Ptolemaic period which have been found in Egypt, their preservation being due to the dryness of the climate, and to the practice of burying documents in tombs. Three must be earlier than 160 B.C., and there are several Homeric fragments on papyri earlier than the Christian era. The most important contain Orations of Hyperides, of which the oldest are assigned to the 1st century B.C. We have from Herculaneum an ancient library consisting of 1803 papyrus rolls, which must be older than 79 A.D.,

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when the city was destroyed. These early Greek uncials being written on papyrus, a fragile material, are slender and delicate, without bold curves, thick downstrokes, or fine hairlines, which only became possible when the use of vellum introduced a firmer and bolder style. In these uncial papyri the introduction of ligatures produced a tendency to cursive forms, which are exhibited in the *ostraca*, of which great numbers have been found in Egypt. These are usually receipts for taxes, scratched with a point or written with ink on potsherds. Our chief knowledge of the early Greek cursive is derived from the private papers and correspondence of Ptolemy, son of Glaucias, a Macedonian Greek, who lived as a recluse at the Serapeum about 170 B.C. Cursive scripts were, however, used by the Greeks at a much earlier period; Greek inscriptions in the Cypriote syllabary exhibiting forms of a distinctively cursive character as early as the 7th century B.C. Compared with the papyri the uncial vellum codices, of which about 300 are known, exhibit a firmer and more set uncial style, which was rendered possible by the material. The oldest to which a definite date can be assigned is the Dioscorides now at Vienna, which from internal evidence must have been written about 506 A.D. Earlier, but undated, are the three great Biblical codices, the *Codex Vaticanus* at Rome, which is assigned to the 4th century; the *Codex Sinaiticus* at St Petersburg, assigned to the end of the 4th or the beginning of the 5th century; and the *Codex Alexandrinus*, now in the British Museum, which probably belongs to the middle of the 5th. The style of the writing in these uncial codices is seen in the subjoined specimen, which is taken from the Septuagint version of Esther, i. 22, as it appears in the *Codex Sinaiticus*.

This in ordinary Greek type would read:

και απεστιλεν εις
πασαν την βασι
λειαν κατα χωραν
κατα την λεξιν αυ
των ωστε ειναι
φοβον αυτοις εν
ταις οικιαις αυτω[ν].

To the 5th century are assigned the palimpsest *Codex Ephraemi* at Paris, to the 6th the *Codex Bezæ* at Cambridge and the *Codex Claromontanus* at Paris. After the 7th century the Greek uncial loses its early style; the letters become oval, narrow, elongated, and cramped, sloping to the right; accents make their appearance, and the pure early uncial degenerates into cursive forms difficult to read.

At the end of the 6th century we find the first beginnings of the new minuscule, the book-hand of the future, which was destined to replace both the deformed uncial and the earlier cursive, from each of which it borrowed certain elements. The earliest traces of these minuscule forms as yet discovered are seen in a collection of papyri, ranging in date from 592 to 616 A.D., which were the business and family papers of Aurelius Pachymius, a dealer in purple dyes. The transition from the old to the new style is exemplified in a most interesting sheet of papyrus from Ravenna, now at Vienna, which contains the signatures of certain bishops to the Acts of the Council of Constantinople, held in 680. The older bishops sign in slanting uncials and the younger men in early forms of the new minuscule. In the 9th century, with the revival of learning, this new minuscule developed into a calligraphic book-hand, which was used in vellum codices. The oldest books in which it appears are the Uspensky Gospels, written in 835, and the Bodleian Euclid of 888 A.D. The chief transformations are due to the use of ligatures, as is plainly seen in the forms of the letters δ, ϑ, and σ. Hence in the fully-formed minuscule of the 11th century we find the letters α, ε, κ, λ, φ, ω, which follow the old uncial forms, while δ, η, μ, ν are taken from the cursive. In the case of several letters the double source of this script is shown by the retention of duplicate forms, β, θ, π, and ς, for instance, being uncials, while ϐ, ϑ, ϖ, and σ are of cursive origin.

From the end of the 12th century to the invention of printing the minuscule continually degenerates, losing its purity and beauty, and breaking up into a rough cursive script. The writing becomes intricate and involved, ligatures and accents being combined into a single character rapidly executed without taking the pen from the paper, thus making the writing very difficult to read. In the earliest printed books the contracted and ligatured forms of contemporary minuscule MSS. were faithfully imitated. These, however, were gradually discarded, though a few, such as ς for στ, ϒ for ου, and ☞ for ος, survived till quite recent times.

Latin Palæography followed much the same course as the Greek. There were four set book-hands—capitals, uncials, semiuncials, and minuscules, of which the two last were influenced by the old Roman cursive. The capitals are of two kinds, Square and Rustic. Square capitals differ little from the lapidary characters used in inscriptions, and may be defined as having their vertical and horizontal strokes at right angles. Of the few examples we possess of this script the best is the St Gall Virgil, assigned to the 4th century. Rustic capitals, which were more usual, are characterised by circumflexed finials and by the crossbars being curved and slightly oblique. This style, which can be traced in a Herculaneum papyrus of the 1st century A.D., was greatly in fashion from the 3d century to the 7th. Good examples are four famous Virgils: the *Codex Vaticanus* assigned to the 4th century, the *Codex Palatinus* to the 5th, the *Codex Romanus* to the 6th, all of which are in the Vatican, and the 5th century Medicean Virgil at Florence. The Rustic died out about the 9th century, and left no successor.

The uncials arose out of the square capitals, and exhibit rounded forms of certain letters. The earliest uncial codices extant are not earlier than the 4th century A.D., but it is plain that uncial

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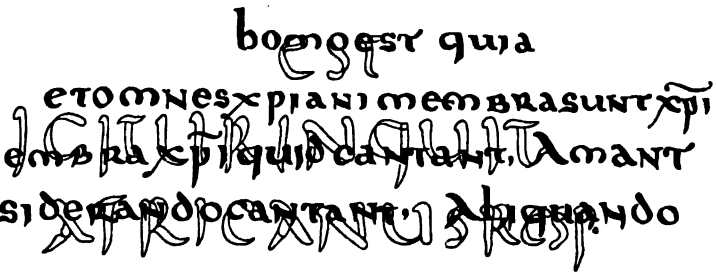
writing was practised at a much earlier period, since we find uncial forms in some of the Graffiti (q.v.) scribbled on Pompeian walls, while as early as the 3d century B.C. the lapidary forms of P, R, C, S show that uncial influences had already transformed the earlier angular shapes of these letters. The uncial book-hand is distinguished from the contemporary square capitals by the rounded forms ϵ ϻ υ ƀ instead of E, M, V, H, and by the tails of P, F, Q, and R falling below the line, while the head of L rises above it.

One of the oldest uncial Latin MSS. is the Vercelli Gospels, said to have been transcribed by the hand of Eusebius himself, but in any case nearly as early as his time. A good example of the later uncials is the copy of the Gospels now in the library of Corpus Christi College, Cambridge, which is believed to have been the actual copy brought from Rome by St Augustine in 596. Also of the 6th century is the *Codex Bezæ* at Cambridge, the style of which is shown in the fac-simile already given. The earlier and later uncial styles are well seen in the famous palimpsest Cicero from the monastery of Bobbio, now in the Vatican. A palimpsest is a manuscript from which the writing was washed off with a sponge, or sometimes scraped or rubbed, in order that the vellum might be used for some other work. The *Codex Ephræmi* above mentioned is a palimpsest, a 5th-century Greek text being overwritten in a 12th-century hand. The Vatican Cicero is a codex consisting of 150 leaves, containing in the first hand the treatise *De Republica*, written in double columns in large uncials, probably of the 4th century. Over this is written across the commentary of St Augustine on the Psalms, in a small uncial hand of the 7th century.



In the fainter writing of the original manuscript we may decipher the words EST IGITUR INQUIT AFRICANUS RESP.[*ublica*]. The writing in the second hand reads (line 1) HOMO EST QUIA, (2) ET OMNES XPIANI [*Christiani*] MEMBRA SUNT XPI [*Christi*], (3) MEMBRA XPI [*Christi*] QUID CANTANT. AMANT, (4) DESIDERANDO CANTANT. ALIQUANDO.

Towards the close of the 7th century the Latin uncial becomes rough and careless, and it deteriorates still further in the 8th, when it is replaced as a book-hand by a new script which goes by the name of semiuncial or half-uncial. This name, which arose out of a misconception of early palæographers, does not signify a script half the size of the uncial, some semiuncials being larger than some uncials, but is used to denote an uncial script with new forms of certain letters, of g and s, for instance, which were derived from the cursive. The earliest traces of the semiuncial style are found towards the end of the 5th century, and the first instance of its use as a book-hand is a Hilary, written in 509 or 510, now preserved in the Chapter Library of St Peter's at Rome.

The old Roman cursive which thus began to influence the uncial writing in the 6th century is of great palæographical importance, since it became the source of many forms in modern scripts. Its existence has long been suspected, but actual examples have only recently been discovered. In a house at Pompeii a number of wax-tablets were found in 1875 which proved to be the business memoranda of L. Cæcilius Jucundus, a Pompeian banker and agent, mostly belonging to the years 55 and 56 A.D., and relating to purchases at auctions, and payments of taxes on behalf of his clients. Similar tablets, which are dated from 131 to 167 A.D., have been discovered in abandoned gold-workings in Dacia. This old Roman cursive, which is very illegible, exhibits the forms out of which arose ſ (the long *s*) and also the modern forms g, b, f, m, n, d, r, h, which replaced the capital and uncial forms G, B, F, M, N, D, R, H. This illegible Roman cursive reappears in a more set official hand in rescripts addressed to Egyptian functionaries in the 5th century, in official documents written at Ravenna in the 6th century, as well as in numerous marginal notes in uncial or semiuncial manuscripts. It is also employed in a copy of Avitus, written in the 6th century, and a Josephus of the 7th. These two books are written on papyrus, and the absence of other examples may be explained by the fact that the fragile papyrus books, probably copies made by scholars for their own use, have mostly perished, only vellum codices as a rule having been preserved.

With the establishment of the Teutonic kingdoms on the ruins of the Roman empire a number of national scripts arose—the Merovingian in France, the Visigothic in Spain, and the Lombardic in Italy. These were all based on the Roman cursive, and were used for civil purposes as well as for charters and other diplomatic documents. The Merovingian became the official hand of the Frankish empire. It is cramped and vermiform, with exaggerated loops for the heads and tails of certain letters. It was used as the diplomatic hand in the chanceries of France and Italy till the 9th century, and in the imperial chancery till 1231, when its use was abolished by Frederick II. It has survived, however, in a modified form in the modern German cursive, in which many of the peculiar forms of the old Roman cursive can be detected. Out of the official Roman cursive arose the script which was employed in papal bulls till the 12th century, when it was replaced by the French minuscule, which was used till the 16th century, when a deformed, contracted, and illegible script called the *littera Sancti Petri* was adopted.

The old cursive derives its chief importance from having been one of the sources from which was developed the semiuncial book-hand which superseded the old uncial. Incorporating sundry uncial forms, the Visigothic and Lombardic cursives developed in the monasteries into calligraphic book-hands. But the Irish semiuncial is the most important of the national scripts, as it became the basis of the 'Roman type,' which is used in our modern printed books. The history of this Irish semiuncial is obscure. Its elements must have been obtained, probably in the 5th century, from the semiuncial book-hand of southern Gaul. The forms of some of the letters are plainly those of the Roman uncial; others are calligraphic forms which must have been derived from an ecclesiastical Gallican type of the Roman cursive. Just as the Greek minuscule has duplicate forms of certain letters, some derived from the uncial, others from the cursive, so the double parentage of the Irish

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semiuncial is demonstrated by the permissive use of N, R, S, which are uncials, and of n, r, f, which are uncialised cursives. Several other forms, such as g, b, a, m, f, h, l, are also uncialised cursives, and not, like the Roman uncials, merely rounded capitals (see IRELAND, Vol. VI. p. 208). This Irish semiuncial suddenly blazes forth in the 6th century as the most splendid of all mediæval scripts. The noblest specimen is the magnificent Book of Kells now at Dublin, which was probably written in the 7th century, though often referred to the 9th (see ILLUMINATION). Of somewhat later date are St Chad's Gospels, now at Lichfield, and the Lindisfarne or Durham Book, commonly called St Cuthbert's Gospels, now in the British Museum, both of which were written in Northumbria, where the script had been introduced by Irish missionaries. This Northumbrian semiuncial formed the basis of the nearly perfect Caroline minuscule, so called because during the reign of Charlemagne it was introduced by Alcuin of York, the friend and preceptor of the emperor, into the calligraphic school at Tours, over which Alcuin presided from 796 to 804. Alcuin seems to have incorporated certain elements from the Roman uncial and the Lombardic minuscule; and the new script, recommended by its legibility, distinctness, and minuteness, was rapidly diffused by Alcuin's pupils over Europe, and rapidly superseded all the other monastic book-hands. Starting at the beginning of the 9th century, it reached its highest perfection at the end of the 11th. In the 13th deformation set in; it stiffens and becomes more cramped, ligatures and contractions are introduced, and out of it grew the Black Letter or Gothic of the 15th century, a form of which still survives in German printed books. The black letter was used in the earliest printed books, but, with the revival of learning, Italian scholars returned to the beautiful Caroline minuscule of the 11th century, which was imitated in the Roman type now universal in Italy, France, Spain, Britain, and America, and which is rapidly replacing the Gothic letter in northern Europe. See PRINTING.

Besides the pure Caroline minuscules used for books, various cursive hands grew out of it, more angular, irregular, and difficult. Such are the Anglo-Saxon and the pointed Irish, the Domesday script (see DOMESDAY), and the deformed hands used in English charters and the records of courts of law. Our modern English script is based on this 'court-hand,' which arose out of the degraded Caroline minuscule—improved, however, in the reign of Elizabeth by the influence of the contemporary Italian hand. It is, however, much superior in legibility and distinctness to the modern German script, which, as we have seen, is to a great extent a survival from the old Roman cursive.

Contractions.—The difficulty of deciphering mediæval MSS. arises largely from the contractions, abbreviations, and ligatures which were employed to economise labour and parchment. To give a complete list within reasonable limits is impossible, more especially as they varied at different periods and in the various scripts. More than 5000 contractions of Latin words were used in France between the 7th century and the 16th, while in England more than 1000 are found in official Latin documents of the Tudor period alone. There are, for instance, six recognised contractions for *quoniam*, seven for *esse*, and ten for *et*. In one class of MSS. qm̄ stands for *quoniam*, in another for *quum*, while qūō denotes *quomodo* in one script and *quoniam* in another. Instead, therefore, of attempting to catalogue the more usual contractions, which are tabulated in several works referred to below, it will be more useful to explain the general principles by which mediæval scribes were guided. In most cases, if not in all, these contractions arose out of ligatures, and were used at first for some particular syllable, and then as time went on they were generalised, so as to denote a whole class. Some of these ligatures we still use. Thus, w, as the name implies, is a ligature for *uu*; æ and œ need no explanation. The two superscript dots, as in ä or ö, which express the German *umlaut*, are merely the ligatures æ and œ.

The usual modern sign of abbreviation is the full point, as in ib. or ibid. for *ibidem*, e.g. for *exempli gratiâ*, or i.e. for *id est*. But this, which seems so natural and simple a sign, appears, when we trace its history, to have arisen out of a ligature for the common Latin termination *-us*. Its earlier form was the colon (:), which stood for *-us*, as in omnib: for *omnibus*. The origin of this colon is explained by the fact that at a still earlier time we find the final syllables *-mus* and *-nus* written ꝯſ and ꝯſ, where the cross stroke ſ, which is merely the long *s*, forms a ligature with the curve ⌣ which represents U. Of this ligature, representing *-us*, everything disappeared except the dots at the top and bottom of the *s*, leaving nı: for *-mus*, or bı: for *-bus*. The upper dot was then omitted as needless, and ultimately the use of the full point (.) was generalised so as to denote the omission of any final syllable. When this had taken place another special sign was required for *-us*. This was 9, so that in later documents we find ei9 for *ejus*, or omnib9 for *omnibus*. But in earlier MSS. the loop of the sign 9 is open at the top, the form �uſ being manifestly the ligature of U and the long *s*.

In viz. for *videlicet*, and oz. for *ounce*, we have survivals of a very frequent abbreviation, which also proves to be a ligature. The *z* is merely used by printers for their own convenience instead of the correct sign ȝ, which is found, by tracing it back, to be only a rapid and slurred way of writing the semicolon (;) without taking the pen from the paper. This sign at one time denoted only the omission either of *et*, as in hab; for *habet*, or of *ue*, as in q; for *que*. The latter, however, was originally written q; where the reversed comma (,) is the letter U, and the dot stands for *e*, as in many other cases, such as ·n· for *enim*, or ÷ for *est*. This ligature was assimilated to the nearly identical ligature (;) for *et*, where the dot (·) represents *e*, and the comma (,) is the remains of the letter T. For a long time this ligature (ȝ or ;) was confined to words ending in *ue* or *et*, as in qnȝ for *quandoque*, quoȝ for *quoque*, ăȝ for *apparet*, oȝ for *oportet*, lȝ for *licet*, tȝ for *tenet*, hȝ for *habet*, sȝ for *scilicet*. Afterwards it was generalised to signify the omission of any final syllable, as in oȝ for ounce, or in the apothecaries' signs ℥ for *uncia*, and ʒ for *drachma*. The sign ℈ for scruple is merely the ligature *ʒr*, the long *s* being crossed by a cursive *r*.

The superscript comma now used to denote the omission of medial syllables or letters, as in can't for *cannot*, or I've for *I have*, was at first merely a superscript *r*, and denoted exclusively the omission of *r* or of a syllable containing *r*, such as *er* or *re*. In English records it forms a ligature with the preceding letter, as in fũnt for *fuerunt*, ṽbo for *verbo*, or ṽs for *tres*.

The circumflex (~) grew out a cursive form of the uncial *m*, and originally denoted exclusively the omission of *m*, then of *n*, and afterwards of other letters. Thus we have oms̃, oms̃, and ꝺes for *omnes*, ꝺia and oms̃ia for *omnia*, hꝺiu̇ and hꝺiu̇ for *hominum*, nō and fi for *non*. The horizontal line (–) is one of the earliest signs of omission, and in some cases, if not in all, is merely a simplified form of the circumflex, as in c̄ for *cum*, āūt for *autem*, ā for *annos*. Its use was, however, less restricted than that of the circumflex, and we still use it in the contraction ℔ for *libræ* (pounds), the

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double bar in ⁊ denoting a double omission. Shillings and pence, now expressed by s. and d., were formerly denoted by ß and đ, abbreviations for *solidi* and *denarii*. The sign $ for dollars is said to be the ligature *dll*, the *S* being merely ß, a cursive Dutch form of *d* (but see DOLLAR). The circumflex (~) which was a cursive *m* was not always written horizontally. We see this in the common sign ꝯ used for *rum*, as suoꝯ for *suorum*, or ꝑvoꝯ for *servorum*. Here ꝑ is the ligature of ꝛ and ᴜ, which is crossed by *m* in the cursive form (~) or (–) written vertically. For *et* there are numerous signs, all of which resolve themselves into ligatures. Some of them, such as &ᵓ, &, and ⁊, require no explanation. They are found in &iã for *etiam*, and in the various forms &c&zera, or &c&ꝛa, or &cet. or &c̄, or finally &c. which we now use for *et cetera*. The sign 7, used in Domesday for *et*, is also a ligature, as is shown by the older forms ᵉl and ᵉl. The sign ÷ or ÷ for *est* is also a ligature, the upper dot standing for *e*, the bar or circumflex for the long *s* (ſ), and the lower dot for *t*. In like manner *esse* is written ·≈·, the two dots each representing *e*, and the two circumflexes being each a long *s*. This became ·=· and then =, whence we obtain =s for *esses*, =t for *esset*, and =mꝯ for *essemus*.

Many similar contractions were also used, most of which can be easily resolved into ligatures. A few of the more common are ꝓ for *pro*, ꝑ for *per* and *por*, and ꝑ and ꝓ for *præ*, ꝙ for *quam*, ꝙ for *quod*, ꝙ for *qui*, ꝫ for *tz*, ꝼr for *frater*, ꝼ for *vel*, ᵴ for *ser* and *si*. Thus we have supius and supiꝯ for *superius*, ꝑpe for *prope*, ꝑꝛ for *proximus*, geñoꝛ for *generosi*, assꝺ for *assisa*, fiꝫ for *fitz*.

BIBLIOGRAPHY.—The study of Palæography requires either an ample purse or access to a good library, the needful works being mostly bulky and costly. The best books of moderate price for the beginner in Greek Palæography are Wattenbach's *Anleitung zur Griechischen Paläographie* and *Schrift-tafeln*, and Gardthausen's *Griechische Paläographie*. For Latin Palæography it would be well to begin with Wattenbach's *Anleitung*, and Arndt's *Schrift-tafeln*. For Mediæval Palæography, Chassant's *Paléographie des Chartes et des Manuscrits*, with his companion volume, *Dictionnaire des Abréviations du Moyen Âge*, are extremely useful little books. Prou's *Manuel de Paléographie* may also be consulted. For English Charters, the student, awaiting Mr Maunde Thompson's long-promised work, has had to fall back upon Wright's *Court-Hand Restored*, published in 1773, and the article 'Records' in Savage's *Dictionary of Printing*. The evolution of the forms of letters is traced in Dr Taylor's book on *The Alphabet*. Subsidiary matters, such as writing materials, gatherings, lineation, punctuation, &c., which are useful in determining the age of MSS., are discussed in the works of Prou and Gardthausen already mentioned, and also in Wattenbach's *Schriftwesen im Mittelalter*, and Leist's *Urkundenlehre*. Of the more costly works, far the most important are the autotype fac-similes published by the Palæographical Society, with Zangemeister's *Exempla Codicum Latinorum*, Wattenbach's *Exempla Codicum Græcorum*, and his *Scripturæ Græcæ Specimina*. For MSS. in England, the fac-similes of National MSS., of Anglo-Saxon MSS., of ancient charters, and of ancient MSS. in the British Museum must be consulted; for German MSS., Sybel's Works and Sickel's *Monumenta Graphica*; for Russian, Sabas' *Specimina Palæographia*; for Italian, the *Archivio paleografico Italiano*; for Spanish, the *Exempla Scripturæ Visigoticæ*; for French, the *Notices et Extraits des Manuscrits*, and the valuable publications of Delisle and Letronne. Among the older works the most important are Walther's *Lexicon Diplomaticum*, Wailly's *Éléments de Paléographie*, Astle's *Origin and Progress of Writing*, Silvestre's *Paléographie Universelle*, Montfaucon's *Palæographia Græca*, Mabillon's *De Re Diplomatica*, and the Benedictine *Nouveau Traité de Diplomatique*.

Palæolithic. See ARCHÆOLOGY, FLINT IMPLEMENTS, STONE AGE; also MAN.

Palæol'ogus, the name of an illustrious Byzantine family, which first appears in history about the 11th century, and attained to imperial dignity in the person of Michael VIII. in 1260 (see BYZANTINE EMPIRE). The last of the dynasty, Constantine XI., fell bravely fighting at the siege of Constantinople. His brothers were princes of the Morea and of Achaia respectively; a daughter of one of them married Ivan III. of Russia. A branch of the family ruled Montferrat from 1306 to 1533.

Palæontology (Gr., 'study of ancient life'), the science or study of fossil organic remains—whether of animal or plant life. The study of fossil animals is sometimes termed palæozoology, and that of fossil plants palæophytology. The aim of palæontology is to attain a knowledge of all the various plants and animals which have successively appeared and disappeared in the course of geological ages. But as the geological record is highly imperfect, and myriads of species must have lived and died without leaving any trace behind them, it is obvious that our knowledge, no matter how enlarged it may become, can never possibly be complete. The history is full of gaps, some of which may eventually be bridged over, but, however that may be, it is nevertheless certain that our knowledge must always bear but a small proportion to our ignorance. Nevertheless, the study of palæontology has been fruitful in results. It has greatly influenced zoology and botany—and that not merely by adding to the number of subjects with which those sciences deal, but especially by the light which it has thrown on the evolution and mutual relations of existing forms of life. Fossil organic remains consist chiefly of the harder parts—such as bones, scales, teeth, shells, crusts, spines, &c.—of animals, and the ligneous tissues of plants (see FOSSILS). In attempting to interpret the evidence supplied by such remains, palæontologists were early led to study, for purposes of comparison, the structures of existing plants and animals. By applying the results of these comparisons to the restoration of extinct forms of life, Cuvier was enabled to establish the law of the 'correlation of organs;' and thus the palæontologist, who has to deal principally with fragmentary remains, is not in such a helpless case as might have been supposed. 'Stated in its most general form, the law of the correlation of organs is the law that all the parts of an organism stand in some relation to one another, the form and characters of each part being more or less closely dependent on, and connected with, the form and characters of all the rest. In other words, an organism is not a fortuitous collocation of unrelated parts, but is composed of mutually adapted and related organs; the possession of any given organ, therefore, implying the possession of other "correlated" parts' (Nicholson and Lydekker). Hence the palæontologist can often infer from an isolated organ or structure the essential characters of the remainder of the organism. But, while the biological sciences have greatly benefited, it is geology which has been most advanced by palæontological research. Without the help of fossils the geologist would be unable to reconstruct the past. By their aid he is able to identify and correlate the various formations which constitute his systems. It is from them that he infers former climatic and geographical changes—that he is able to distinguish between fresh-water and marine, shallow-water and deep-sea conditions, &c. But for the general relations of palæontology to geological research the reader is referred to the article GEOLOGY. Some account of the palæontology of the stratified or fossiliferous rocks will be found in the articles that deal with the various geological systems. Here all that need be done is to summarise the characteristic features of the Palæozoic, Mesozoic, Cainozoic, and Quaternary or Post-Tertiary faunas and floras.

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Palæozoic Life.—The most prominent types of Palæozoic times were Graptolites, Rugose corals, Brachiopods, Crinoids, Pteropods, Nautilid Cephalopods, Trilobites, Eurypterids, and Heterocercal Ganoids. Graptolites ranged from the Cambrian into the Lower Old Red Sandstone, but attained their maximum in Lower Silurian times. Rugose corals, unknown in the Cambrian, swarmed in Silurian, Devonian, and Carboniferous seas, but were much less numerous in those of the Permian. Crinoids first appear in the Cambrian, are numerous in Silurian and Devonian rocks, but more abundant still in the Carboniferous. After this they begin to decline. Brachiopods, commencing in the Cambrian, abounded all through Palæozoic times, but culminated in the Upper Silurian period. They were still numerous in Devonian and Carboniferous seas, but less abundant in those of the Permian period. Pteropods were more common in Upper Cambrian and Silurian than during Devonian and Carboniferous times. Nautilid Cephalopods first appear in the Upper Cambrian, and seem to culminate in the Silurian, but they continued to abound in the Devonian and Carboniferous seas, becoming reduced in those of the Permian period. Trilobites appear first in the Cambrian, reach a maximum in the Silurian, wane in the Devonian and Carboniferous, and die out in the Permian. They are therefore essentially and characteristically Palæozoic forms. So likewise are the Eurypterids, which, culminating apparently in the Upper Silurian and Old Red Sandstone, became extinct in Carboniferous times. Ganoids with heterocercal tails first appear in Upper Silurian strata, and reach their maximum in the Old Red Sandstone. The great order of Sharks and Rays likewise dates back to Upper Silurian times. Such are the more prominent types in Palæozoic strata. Many other forms, however, are met with, amongst which may be noted starfishes (Asteroidea), brittle-stars (Ophiuroidea), sea-urchins (Echinoidea), and the wholly extinct and characteristic Palæozoic types, Cystoidea and Blastoidea. Amongst the crustacea were cirripedes, ostracods, phyllopods, king-crabs, amphipods, isopods, long-tailed decapods, and stomapods. Arachnids were represented by scorpions and other forms; myriapods and insects by a number of ancestral types. All the great classes of molluscan life were present—Cephalopods appearing first in the Upper Cambrian; Pteropods in Lower Cambrian; Gasteropods in Lower Silurian; and Lamellibranchs in Upper Cambrian. The fishes have been already mentioned. Amphibians, represented by Labyrinthodonts and Salamandroids, appear first in Carboniferous strata.

Amongst plants the prominent Palæozoic types are cryptogams—Lepidodendroids, Sigillarioids, and Calamites being exclusively Palæozoic, but conifers were also present.

It may be noted that many of the characteristic life-forms of Palæozoic times were what are termed *synthetic* or *comprehensive* types, that is to say, types which while belonging fundamentally to some particular division or group of the animal kingdom, yet present in their structure characteristics of one or more contemporaneous, or as yet non-existing types. Among such intermediate or comprehensive forms may be mentioned the Labyrinthodonts, which were urodele amphibians with many piscine and reptilian characteristics. Examples are also furnished by the Ganoids, the Trilobites, the Brachiopods, the insects, &c. Amongst plants the Lepidodendroids exhibit similar peculiarities, for they combine characteristics of club-mosses and conifers. Again, many Palæozoic forms attained a larger size than the corresponding forms that belong to later times. Thus, some of the pteropods, cephalopods, ostracods, phyllopods, and insects were larger than any corresponding forms of our own day. The amphibians likewise exceeded in size any living representatives of their class.

Innumerable Palæozoic genera died out before Mesozoic times, while not a few lived on, and some have even persisted to the present day. These persistent forms are met with chiefly among the lower types of animal life, as foraminifers, brachiopods, and molluscs. See CAMBRIAN, SILURIAN, OLD RED SANDSTONE, CARBONIFEROUS, and PERMIAN SYSTEMS.

Mesozoic Life.—The life of Mesozoic times is in many respects strongly contrasted with that of the Palæozoic era. In place of Sigillarioids and Lepidodendroids, the prevalent forms of plant-life up to the close of the Cretaceous period were arborescent and herbaceous ferns, conifers, and cycads, while in late Cretaceous times the earliest angiosperms appeared. Corals, which were plentiful in Mesozoic seas, consisted almost exclusively of modern types—the rugose corals having waned almost to extinction. Echinoids and starfishes abounded, but Crinoids, so prevalent in Palæozoic seas, were now much reduced in numbers. Some of the higher grades of the crustacea, which are hardly known in Palæozoic rocks, were plentiful in Mesozoic times, and the same was the case with insects. Brachiopods ceased now to be dominant forms; while amongst molluscs the Cephalopods take the lead, and reach their culmination in swarms of Ammonitidæ and Belemnitidæ. Gasteropods and Lamellibranchs are well represented, and include a number of modern genera, which increased towards the close of the era. Ganoids were still numerous, mostly with symmetrical tails. Chimæroids, true sharks, and rays were all represented, while Teleosteans or bony fishes made their first appearance. Labyrinthodonts, which in Triassic times attained a great size, soon died out, making way for the advent of a prodigious reptilian fauna, in which all orders, save the Ophidians, were represented. There were swimming reptiles (Ichthyosaurus, q.v., Plesiosaurus, q.v.), flying reptiles (Pterodactylus, q.v.), snake-like reptiles (Dinosaurs, see DINOSAURIA), crocodiles, and chelonians. This reptilian life was specially abundant in Jurassic times. Birds probably were numerous, some of the forms being toothed, while others may have approximated to modern types. Mammals were represented by only the inferior grade of marsupials, and were all of small size. All the remarkable reptiles referred to became extinct before the beginning of the Cainozoic era. So it was with the characteristic Mesozoic molluscan families of Ammonitidæ, Belemnitidæ, and Hippuritidæ. Putting aside the lowly organised Protozoa, it may be said that hardly one Cretaceous species has been met with in Cainozoic or Tertiary strata. See TRIASSIC, JURASSIC, and CRETACEOUS SYSTEMS.

Cainozoic Life.—The plants of early Cainozoic times, although differing specifically and often generically from living forms, yet approach on the whole to existing types. Palms were a common feature of the floras from Eocene into Pliocene times. Indo-Australian types were common in Europe during the early Eocene, but later on forms characteristic of the warmer latitudes of North America began to abound. A commingling of Indo-Australian and American types also marked the Oligocene period, but the American forms gradually increased until in Miocene times they preponderated over all the others. The Pliocene flora of central Europe had a prevalent Mediterranean character. With regard to the lower forms of animal life, all that need be noted here is the general fact that these have a modern aspect, the

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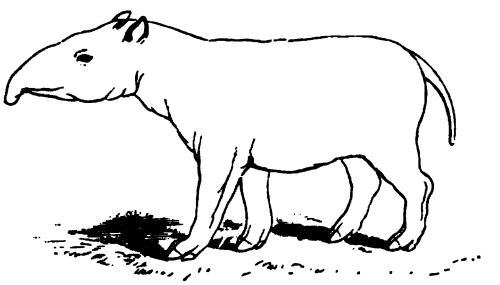
number of existing genera and species becoming greater as we advance from the lower to the higher stages. The foraminifers attained now their maximum development, and are characteristically represented by the large coin-shaped nummulites. Amongst molluscs the Cephalopods are no longer dominant forms—the most abundant groups being Lamellibranchs and Gasteropods. But the most striking and leading Cainozoic forms were the mammals. In Eocene times the mammals were greatly developed—many of the forms attaining a large size. Among the more notable types of the early European Tertiary are Palæotherium (q.v.), Anoplotherium (q.v.), along with which were carnivores, rodents, insectivores, and bats, and also the earliest representatives of the horse and the monkey tribe. The later Tertiaries are marked by the appearance of Dinotheres, Mastodons, true elephants, rhinoceroses, hippopotamus, deer, antelope, gazelles, various carnivores, such as Machairodus, bears, cats, wolves, &c., and apes. No certain or unequivocal evidence of man is yet forthcoming from Tertiary strata.

While it is true that the general aspect of the plant and animal life of the Cainozoic era approaches to that of the present, yet this is truer for the less highly organised types than it is for those which are higher in the scale of being. Amongst the higher vertebrates of early Tertiary times not a few possessed characters which are now met with only in widely separated forms. Some, for example, were intermediate in character between tapirs and horses; in others (Tillodonts) we meet with a combination of structures now seen in ungulates, rodents, and carnivores; while many of the carnivores had decided marsupial affinities. Other remarkable composite forms were the Dinocerata (q.v.).

Quaternary or Post-Tertiary Life.—The animals and plants of Quaternary age belong for the most part to existing species; a number of the higher vertebrates, however, are extinct. Among these latter, in Europe, were the Mammoth and various other elephants, several rhinoceroses, a dwarf form of hippopotamus, and Machairodus. In North America the fauna also included various extinct species, such as Mastodon, an elephant, and several gigantic members of the Sloth family (Megatherium, Mylodon, Megalonyx). These last seem to have abounded in South America, where they were associated with great armadillos (Glyptodon). The Quaternary period was characterised by marked oscillations of climate, and consequently by secular migrations of flora and fauna. Thus numerous forms which had survived from the Tertiary era eventually became extinct, and a still larger number were banished from the areas which they had occupied in Pliocene times. It is in the deposits of the Pleistocene that we meet with the first unquestioned relics and remains of man. See PLEISTOCENE SYSTEM, POSTGLACIAL AND RECENT SYSTEM; works cited at GEOLOGY; and the special handbooks of Palæontology, as by Nicholson (new ed. 1889), Seeley (1885), Steinmann and Döderlein (1888), Zittel (i.–iii. 1879–90), &c.

Palæotherium (Gr., 'ancient wild beast'), a genus of pachydermatous mammalia whose remains occur in the Eocene beds of England and the Continent. Several species have been described, ranging in size from that of a sheep to that of a horse. The Upper Eocene gypseous quarries of Montmartre supplied the first scanty materials, which Cuvier, by a series of careful and instructive inductions, built up into an animal resembling the existing tapir. The restoration, however, is not quite correct, for the discovery of a complete skeleton (*P. magnum*) shows that the animal was longer-necked, and of a more slender build than the tapir, and probably was not unlike, in general appearance, the living llama. There can be no doubt, however, that Palæotherium resembled the tapir in having the snout terminating in a short proboscis. It had three toes on each foot, each terminated by a hoof. The formula of the teeth is i. $\frac{6}{6}$, c. $\frac{1}{1}$, p.m. $\frac{7}{7}$–$\frac{4}{4}$, m. $\frac{3}{3}$, and the structure of the upper true molars, in certain particulars, seems to foreshadow that of some of the Equidæ.



Palæotherium magnum.

It is supposed that animals of this genus dwelt on the margins of lakes and rivers, and that their habits were similar to those of the tapir.

Palæozoic (Gr., 'ancient life'), the name given to the lowest division of the fossiliferous rocks, because they contain the earliest forms of life. They were formerly, and are still generally, known as the Primary rocks. The strata included under these titles are the Cambrian, Silurian, Devonian and Old Red Sandstone, Carboniferous, and Permian systems.

Palafox y Melzi, JOSÉ DE, Duke of Saragossa, a Spanish soldier, was born in 1780 of a distinguished Aragonese family, and rose to the rank of brigadier-general in the Spanish guards. His defence of Saragossa (q.v.), 22d July 1808 to 21st February 1809, which only yielded to the French after a second investment, is one of the most heroic incidents in modern history. Palafox y Melzi was carried prisoner to France, and not released until 1813. The year after his return home he was appointed captain-general of Aragon, in 1836 was created Duke of Saragossa, and in 1837 grandee of Spain and captain-general of the guards. He died at Madrid, 15th February 1847.

Palagonite-tuff, usually associated with basalt-lavas, is fine-grained, red, brown, and sometimes greenish or yellowish in colour. Under the microscope it is seen to be composed of minute fragments of volcanic glass, crowded amongst which are granules and crystals of augite, olivine, plagioclase, and magnetite. It occurs in Sicily, the Canary Islands, the Faroe Islands, Iceland, and Scotland. See IGNEOUS ROCKS.

Palanpur, capital of a native state in Gujarat, lies 83 miles N. of Ahmedabad by rail. The state has an area of 3150 sq. m. and a pop. of 234,402. The 'Palanpur Agency' comprises, besides Palanpur, twelve other small native states.

Palanquin, or PALKI, an Indian vehicle corresponding somewhat to the Roman litter and the modern European sedan-chair, but, unlike the latter, used for long distances by travellers where railways or good carriage-roads do not exist. It is a wooden box, about 8 feet long, 4 feet wide, and 4 feet high, with wooden shutters which can be opened or shut at pleasure, and constructed like Venetian blinds. At each end of the palanquin, on the outside, two rings are fixed, and the *hammals*, or palanquin-bearers, of whom there are four, two at each end, support the palanquin by a pole passing through these rings.

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Palapteryx (Gr., 'ancient apteryx'), a genus of fossil birds whose remains are found in the river-silt deposits of New Zealand, associated with the gigantic Dinornis, and which, like it, resembled in the form of the sternum, and the structure of the pelvis and legs, the living wingless apteryx. Palapteryx, however, seems to have possessed rudimentary wings, in which respect it differed from Dinornis. See MOA.

Palate, the roof of the mouth, consists of two portions, the hard palate in front and the soft palate behind. The framework of the *hard palate* is formed by the intermaxillary bones, the palate processes of the superior maxillary bones, and by the horizontal processes of the palate bones, and is bounded in front and at the sides by the alveolar arches and gums, and posteriorly is continuous with the soft palate. It is covered by a dense

The Mouth widely opened so as to show the Palate:
1, 1, the upper, and 2, the lower lip; 3, 3, the hard palate; 4, 4, the soft palate; 5, the uvula; 6, 6, the arches of the soft palate; 7, 7, the tonsils; 8, the tongue.

structure formed by the periosteum and mucous membrane of the mouth, which are closely adherent. Along the middle line is a linear ridge or raphe, on either side of which the mucous membrane is thick, pale, and corrugated, while behind it is thin, of a darker tint, and smooth. This membrane is covered with scaly epithelium, and is furnished with numerous follicles (the palatal glands). The *soft palate* is a movable fold of mucous membrane enclosing muscular fibres, and suspended from the posterior border of the hard palate so to form an incomplete septum between the mouth and the pharynx; its sides being blended with the pharynx, while its lower border is free. When occupying its usual position (that is to say, when the muscular fibres contained in it are relaxed) its anterior surface is concave; and when its muscles are called into action, as in swallowing a morsel of food, it is raised and made tense, and the food is thus prevented from passing into the posterior nares, and is at the same time directed obliquely backwards and downwards into the pharynx.

Hanging from the middle of its lower border is a small conical pendulous process, the *uvula;* and passing outwards from the uvula on each side are two curved folds of mucous membrane containing muscular fibres, and called the *arches* or *pillars of the soft palate.* The *anterior pillar* is continued downwards to the side of the base of the tongue. The *posterior pillar* is larger than the anterior, and runs downwards and backwards to the side of the pharynx. The anterior and posterior pillars are closely united above, but are separated below by an angular interval, in which the *tonsil* of either side is lodged. The tonsils (*amygdalæ*) are glandular organs of a rounded form, which vary considerably in size in different individuals. They are composed of an assemblage of mucous follicles, which secrete a thick grayish matter, and open on the surface of the gland by numerous (twelve to fifteen) orifices. The space left between the arches of the palate on the two sides is called the *isthmus of the fauces.* It is bounded above by the free margin of the palate, below by the tongue, and on each side by the pillars of the soft palate and tonsils.

As the upper lip may be fissured through imperfect development (in which case it presents the condition known as Hare-lip, q.v.), so also may there be more or less decided fissure of the palate. In the slightest form of this affection the uvula merely is fissured, while in extreme cases the cleft extends through both the soft and hard palate as far forward as the lips, and is then often combined with hare-lip. When the fissure is considerable it materially interferes with the acts of sucking and swallowing, and the infant runs a great risk of being starved; and if the child grows up its articulation is painfully indistinct. The closure of cleft palate by operation must be left in the hands of an experienced surgeon, who should be called to see the child as soon as the defect is noticed. If the separation is too great to admit of closure by operation, a plate or 'artificial palate' may be made to cover the opening.

Acute inflammation of the tonsils, popularly known as Quinsy, is treated of in a separate article. Chronic enlargement of the tonsils is very frequent in scrofulous children, and is not rare in scrofulous persons of more advanced age, and may give rise to very considerable inconvenience and distress. It may occasion difficulty in swallowing, confused and inarticulate speech, deafness in various degrees from closure of the Eustachian tubes (now often termed *throat deafness*), and noisy and laborious respiration, especially during sleep; and it may even cause death by suffocation, induced by the entanglement of viscid mucus between the enlarged glands. If local and constitutional remedies fail to reduce the enlarged tonsils they must be more or less removed by the surgeon, either by the knife or scissors, or by a small *guillotine* specially invented for the purpose.

Enlargement or relaxation of the uvula is not uncommon, and gives rise to a constant tickling cough and to expectoration, by the irritation of the larynx which it occasions. If it will not yield to local treatment it may require to be removed either in whole or in part.

Palatinate, a name applied to two German states, which were united previously to the year 1623. They were distinguished as the Upper and Lower Palatinate. The Upper or Bavarian Palatinate, now forming a circle of the kingdom of Bavaria, was a duchy, its capital being Amberg. The Lower Palatinate, or the Palatinate on the Rhine, lay on both sides of the Rhine, with an area of 3150 sq. m., and included, besides the Electoral

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Palatinate proper, the principality of Simmern, the duchy of Zweibrücken, the principalities of Veldenz and Lautern, &c., and was bounded by Mainz, Trèves, Lorraine, Alsace, Baden, and Würtemberg. Its capital was Heidelberg.

The counts of the Rhenish Palatinate were established in the hereditary possession of the territory of that name, and of the lands attached to it, as early as the 11th century. In 1216 it was granted to the Duke of Bavaria, and with various combinations the Rhenish Palatinate and the Bavarian territories were held by members of the Bavarian house and its branches. Sometimes the electoral dignity was alternately exercised by the Duke of Bavaria and the holder of the Rhenish Palatinate. In 1559 the Rhenish Palatinate and the electoral vote passed to Frederick III., who introduced Calvinism. Frederick V. (q.v.) was the 'Winter King' of the Thirty Years' War, who in 1623 lost his lands to his kinsman the Duke. Bavaria retained the Upper Palatinate and the electoral dignity; but the Rhenish Palatinate was in 1648 given to Frederick's son, and the eighth electorate created for him. In 1694, during the war of the Spanish succession, the elector received again the Upper Palatinate and all the ancient rights, resumed again by Bavaria after the war. During this time the Rhenish Palatinate was repeatedly and cruelly desolated by French armies; and in 1801 France took possession of all on the left bank of the Rhine, giving the rest to Bavaria, Nassau, and Hesse Darmstadt. In 1815 the left bank was restored to Germany, the larger part of the Lower Palatinate being granted to Bavaria (Rhenish Bavaria); Prussia got the Rhine Province; Hesse Starkenburg and Rhine Hesse; and Baden Mannheim, Heidelberg, and Mosbach. The palatinate had to change its religion frequently in accordance with the tenets of the reigning prince, being successively Catholic, Calvinist, Lutheran, Calvinist, and Catholic again. For the area and population of the modern provinces of the Upper and Lower Palatinate, see the article BAVARIA.

Palatine (from Lat. *palatium*, 'palace'). A *Comes Palatinus*, or Count Palatine, was, under the Frankish kings of France, a high judicial officer (see COUNT), his district being called a *palatinate* or *county palatine*. There were long three counties palatine in England—Lancaster, Chester, and Durham—the two last of which were, no doubt, made separate regalities on account of their respective proximity to the frontiers of Wales and of Scotland. Chester and Durham became palatine under William I., Lancaster not till 1451. Chester had not merely its own courts, judges, constable and steward, but a parliament, and was not represented in the national parliament till 1549. At various dates Kent, Shropshire, Pembrokeshire, the Isle of Ely, and Hexhamshire, were counties palatine, but had lost their special rights by the 16th century. Cheshire was assimilated by Henry VIII. Durham ceased to be a county palatine under its bishop in 1836; and Lancaster (see LANCASTER, DUCHY OF) yielded its jurisdiction in 1873 to the High Court of Justice. In very early times there were a number of similar privileges in Scotland, the most important of which was that of the Earls Palatine of Strathearn.

Palatine Hill (*Mons Palatinus*), the central hill of the famous seven on which ancient Rome was built, and, according to tradition, the seat of the earliest Roman settlements. See ROME.

Pale, in Irish history (see IRELAND, Vol. VI. p. 204), means that portion of the kingdom over which the English rule and English law was acknowledged. It varied very greatly at various dates, but for a long period meant generally Dublin and the greater part of the adjoining counties.

Palem'bang, capital of a residency (formerly an independent kingdom) near the south end of Sumatra, stands on the river Musi, 50 miles from its mouth; the houses of the town are built on great log rafts on either bank. Manufactures, trade in silk goods, carved wood, ornaments in gold and ivory, and krises, as well as shipbuilding, are carried on. In the middle ages Palembang was one of the most important centres of Arabian trade with China. Pop. 43,368; and of the residency, 627,419.

Palencia (the ancient *Pallantia*), a walled city of Spain, in Old Castile, stands in a fruitful plain, 180 miles by rail NNW. of Madrid and 29 NNE. of Valladolid. The Gothic cathedral was built 1321–1504. The first university of Castile was founded here in 1208, but was removed to Salamanca in 1239. Blankets and coarse woollen cloths are manufactured. The vine is cultivated, and there is a good trade in wool. Pop. 14,505. —The *province* of Palencia has an area of 3256 sq. m. and a pop. (1887) of 188,954.

Palenque, RUINS OF, lie between the Michol and Chacamas rivers, in the north of the Mexican state of Chiapas, 6½ miles E. of the village of Santo Domingo de Palenque. The ruins extend over 20 to 30 acres, and are buried in a dense tropical forest; trees grow over and about the buildings, and rise even from the tower. The ruins consist of vast artificial terraces, or terraced truncated pyramids, of cut stone, surmounted by edifices of peculiar and solid architecture, also of cut stone, covered with figures in relief, or figures and hieroglyphics in stucco, with remains of brilliant colours. Most of the buildings are of one story, but a few are two, three, and some may have been four stories. The principal structure, known as the Palace, is 228 feet long, 180 feet deep, and some 25 feet high, standing on a terraced truncated pyramid of corresponding dimensions; the front contained fourteen doorways, each about 9 feet wide. The building was irregular, and built in two distinct parts, with double galleries of unequal length running round it, and two large courts, also irregular in shape. Charnay holds that the Palace was a magnificent convent; Palenque, he says, was a holy city, 'a place of pilgrimage, teeming with shrines and temples, a vast and much-sought burial-place;' in the whole place 'there seems to have been nothing but temples and tombs.'

See Stephens's *Incidents of Travel in Central America*, &c., and Catherwood's *Views of Ancient Monuments*, &c.; Charnay's *Ancient Cities of the New World* (Eng. trans. 1887); also La Rochefoucauld, *Palenque et la Civilisation Maya* (Paris, 1888).

Palermo, formerly the capital of Sicily, now in point of population the fifth city of Italy, an archbishopric, and a seaport. It stands in the north-west corner of the island, on a bay that faces east, and at the mouth of a fertile valley called the Conca d'Oro ('Golden Shell'), 120 miles by rail W. of Messina, and occupies a picturesque site, being backed by mountains—on the north by Mount Pellegrino, with a (pilgrimage) grotto chapel (1624) to St Rosalia, whose festival is one of the great annual events of the city. The streets are for the most part handsome, and there are many fine old houses. The oldest public buildings date from the Norman period, and belong to two styles of architecture—Saracen and Byzantine. The most conspicuous of them all is the cathedral of St Rosalia, built (1169–85) by an Englishman, Archbishop Walter; it contains sepulchral monuments to Roger I., the emperors Henry VI. and

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Frederick II., and in the crypt the tombs of the archbishops. Others to be named are the chapel (1143) in the royal palace, with magnificent mosaics; the Norman hall, in the same pile; and the churches of Martorana (with fine mosaics), St John of the Hermits (1132), and St Cataldo; and the mansions of Ziza, Cuba, La Favara, and Mimnerno, all outside the city. There are close upon three hundred churches and chapels in Palermo. The royal palace, built by Roger I., is principally of Spanish construction; in it Piazzi established his observatory. The other public buildings—archbishop's palace, town-house, law-courts, university, arsenal, &c.—do not call for particular mention. The university (1447) has 70 teachers and 1100 students, with schools of engineering, fine arts, conveyancing, &c. There are also a national museum, the town library (1775) with 141,000 vols. and 2640 MSS., and the national library (1804) with 110,000 vols. and 12,000 MSS. Industry is little developed; machinery, essences, sumach, turnery, iron-founding, books, gloves, and shoes represent almost the only branches. But Palermo is an important seaport, with a large, though not growing, trade. Oranges, lemons, dried fruits, sumach, tartar, grain, oils, manna, sulphur, wine, animal produce, and lemon-juice are the principal exports, and average £1,457,700 per annum. The imports—grain and vegetables, cottons and woollens, coals, live-stock, iron, timber, groceries, silk, hides, petroleum, machinery, linen, metals, and glassware—fell from £1,439,515 in 1887 to £732,167 in 1889. The bulk of this trade is with Great Britain, France, and the United States. There is also a coasting trade—imports, from 3 to 3½ millions sterling; exports, about 1 million sterling. Some 3500 vessels of 1,200,000 tons enter every year, an average of 430,000 tons being British and 685,600 tons Italian. Pop. (1881) 205,712. The first we know of Palermo, the ancient *Panormus*, is that it was a Phœnician city, and the stronghold of Carthage in Sicily. It was conquered successively by Pyrrhus (276 B.C.), the Romans (254 B.C.), the Vandals (440 A.D.), Belisarius (535), the Saracens (835), the Pisans (1063), and the Normans from Apulia (1071). Henceforward it was the capital of the kingdom of Sicily (q.v.), first of the Norman kingdom, then of that of the Angevins and their Spanish successors. It suffered severely from earthquakes in 1693, 1726, and 1823. The city revolted against the Bourbon kings of Naples in 1820 and 1848, and was freed from them in 1860 by Garibaldi. But since then it has been only a provincial capital.—The *province* of Palermo has an area of 1985 sq. m. and a pop. (1889) of 774,070.

See the excellent guidebook of Gsell Fels; Morso, *Descrizione di Palermo Antico* (1827); Schubring, *Historische Topographie von Panormus* (1870); Springer, *Mittelalterliche Kunst in Palermo* (1869); Holm, *Studii di Storia Palermitana* (1880); Freeman, *Historical Essays* (3d series, 1879), and his *History of Sicily* (1891).

Palestine.—I. *History.*—The name of Palestine is an illustration of the part taken for the whole. In the song of Moses (Exod. xv. 14) sorrow falls upon Palestina, and amazement upon Edom at the coming of Israel. Palestine was to Moses as it was afterwards to Isaiah and to Joel, to Herodotus, to the Greeks, the Egyptians, and the Assyrians, to Josephus and to Jerome, simply the Plain of Philistia, the broad slip of coast inhabited by the Philistines. Milton restricts the word to this sense. The country has received various names at different times, with all of which we are familiar. It has been called Canaan, or the Land of Canaan, the Land simply, the Land of Israel, the Land of Promise, and the Holy Land, a name which, in the words of Quaresmius, 'though of later date than the rest, yet in excellency and dignity surpasses them all.'

The nations inhabiting this country at the time of the Conquest were, according to the list generally given, six in number. A seventh nation is added in one or two lists. These nations were the Canaanites, the Hivites, the Hittites, the Amorites, the Perizzites, and the Jebusites. The seventh were the Girgashites. The Canaanites—'low-landers'—occupied the country east and west of the highlands—that is to say, the seaboard and the valley of the Jordan; the Hittites, a branch of the great kingdom whose extent and history are only now beginning to be recovered, dwelt in what was afterwards Judæa, the Hivites in Samaria, the Perizzites in Galilee, the Amorites in the north, the Jebusites in and around Jerusalem. Of the Girgashites nothing is known. Other tribes there were—those of Moab, Ammon, Midian, and Edom on the east of Jordan, all of Semitic descent; the tall races—Rephaim, Zuzim, and Anakim; the Horim cave-dwellers; and there were the Amalekites, who defended the mountain-passes near Sinai, and the Philistines, of Egyptian origin; in later times they were called Cherethites, and at this day there is a village in Philistia called Keretiya.

The flood of conquest rolled over these tribes. When the invaders had settled down within the boundaries allotted to them, we find them fighting for their new possessions, being driven back in consolidating their position. The conquered people were nowhere exterminated: the Jebusites held their own in Jerusalem, the Amorites in Ephraim; the Philistines took and lost and retook Gaza and Ascalon. There are many who regard the fellaheen of modern Syria as the direct descendants of the Perizzite, the Amorite, and the Hivite.

How long the Israelite tribal distinctions were kept up it is difficult to say. We find them strongly marked in the early history, but they grow fainter in the later books. It is not without significance that Solomon's twelve provinces corresponded mainly with the twelve tribes. During the term covered by the Book of Judges and part of Samuel there was no capital city and no central authority. The religious centre was shifted; the ark rested at Shiloh, at Nob, at Gibeon, and at Bethel. Jerusalem became the capital of David and Solomon, but on the foundation of the northern kingdom Shechem, Tirzah, and Samaria became successively its capital.

When the Jews returned from the great Captivity they occupied a territory extending from Jerusalem in the north to Beersheba in the south, and from Jericho in the east to Lachish in the west. The Philistines remained in undisturbed possession of their lands; the Idumæans were driven back to their deserts; on the north were the hostile Samaritans.

The Maccabean struggle for independence—a part of history which finds few students, yet a struggle heroic in its conduct and stupendous in its results—preserved the national existence. That there were Jews in the time of Herod, that there are Jews still, is due to the heroism of the immortal brothers.

The kingdom of Herod the Great covered the whole country divided into tribes by Joshua, with the exception of a small portion in the south-west and the tribe of Asher in the north. West of Jordan it contained Galilee, a province unknown by that name to the Old Testament; Samaria, also unknown before the Captivity; Judæa and Idumæa: east of the Jordan it contained Peræa, Gaulonitis, Auranitis, and Trachonitis—the ten cities of the Decapolis belonged partly to Peræa and partly to Gaulonitis. Of these provinces the most fertile and the most densely populated was

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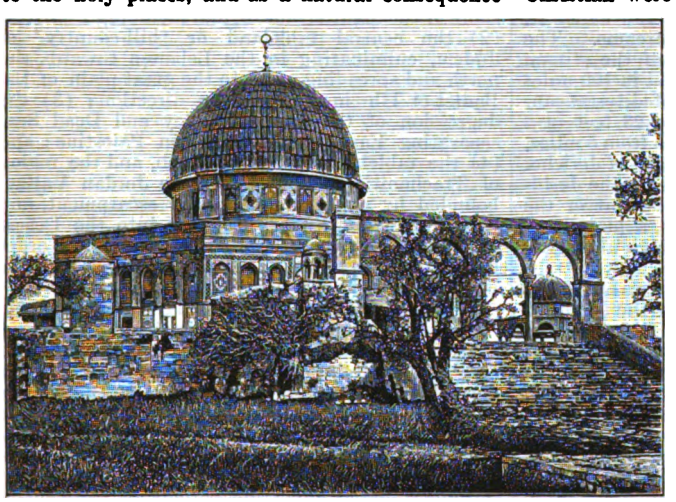
Galilee. He who takes the trouble to examine the large map of the Palestine Exploration Fund and to compare with it the statements made by Josephus will be astonished at the overwhelming evidence of a vast population and of exuberant fertility. Nowhere else in the country are there so many ruins of ancient towns; on every hill-top in a country which is a succession of hills is a Khurbet or ruin; springs abound; there are the traces of ancient terraces on the hillsides, extensive heaps of pottery, ancient cemeteries, broken oil-presses, groups of rock-hewn cisterns; proofs on all sides of the ancient prosperity.

This period of prosperity, encouraged by the Roman rulers, was destroyed by the madness of the Jews themselves. It vanished with the campaign of Vespasian and with the destruction of the temple by Titus. Even these rude lessons failed to quell the fiery spirit of the people. A second time they rose in revolt, not only in Judæa, but also in Egypt, Cyrene, Babylonia, Cyprus, and Mesopotamia. They were subdued. But again, when Hadrian endeavoured to suppress altogether this turbulent Judaism, there followed a rising, the wildest, the most blood-thirsty of all the Jewish revolts. It was led by Bar-Cochba (q.v.), 'Son of the Star,' the pretended Messiah, whose pretensions were recognised by Akiba (q.v.) himself, most learned of all the Jewish doctors. The rebellion was followed by a siege of Jerusalem, concerning which history is almost silent. It was probably marked by all the horrors which belong to the siege by Titus. The last stand was made at the fortress of Bether, when Bar-Cochba with an immense number of his followers was slain.

Then for a period Jerusalem vanishes from history. It is *Ælia Capitolina;* a temple of Jupiter was erected on the site of Herod's temple; no Jew was allowed to appear even within sight of the Holy City. Outside, for the next hundred years, though persecutions raged, the progress of Christianity was rapid and continuous; pilgrimages began to the holy places, and as a natural consequence



Mosque of Omar, Jerusalem.

more holy places were discovered every day. After the conversion of Constantine, the finding of the Cross, and the building of the church of the Holy Sepulchre, the history of Palestine becomes for three hundred years ecclesiastical. The country was all the time a battlefield, but the weapons were tongues and pens, and the missiles were words and arguments. Arius, Pelagius, and other persons of curious and questioning disposition kept the Holy Land in a continual state of unquiet. The Samaritans gave trouble from time to time by murdering Christians; they were quieted in the usual manner, 'by punishment.' All Syria became a nest of monasteries, nunneries, and hermitages. In order to build their monasteries the old synagogues, the old fortresses, were destroyed and their stones used again. In every cave was a recluse; on every hillside lived a hermit; some erected lofty pillars and lived upon the top for all to see; the discovery of relics, holy bones, and holy places went on without interruption. Day and night, it is said, the air resounded with litanies. In a word, the land was given over to monks, for whom the country-people—the descendants of the Perizzites and the Amorites—tilled the fertile soil, grew the corn, pressed the oil, and made the wine.

Then King Chosroes, the Persian, marched into Syria (614 A.D.). The Jews, who had been quiet, but were neither dead nor converted, raised their heads in hope and gladly joined his victorious army. What the Persians did in the country itself may be guessed from the fact that in Jerusalem alone they massacred 90,000 Christians (the number may be taken as indicating a gigantic slaughter) and destroyed the whole of the buildings. When they retreated they left behind them along the broad track of their march ruined churches and monasteries destroyed by hundreds, with thousands of dead Christians to rejoice the eyes of the Jews who followed in the train. Fifteen years later Heraclius reconquered the province of Syria. The ruined churches were partly restored, the monasteries partly rebuilt. But for six years only, for then followed an enemy worse than Chosroes, because, though the Persian destroyed, he went away. The new-comer came to stay. In the year 636 A.D. the calif Omar with his Moslems took Jerusalem and proceeded to reduce the whole of the country, which indeed offered no resistance. After three hundred years of the ecclesiastics followed four hundred years of the Moslems. Jew and Christian were alike tolerated; the latter with a little less contempt than the former. Early in this period the Dome of the Rock ('Mosque of Omar'), the most beautiful building in the world, was erected for Abd el Melek by Byzantine architects. The church of the Holy Sepulchre, or the group of churches bearing that collective name, was completed and beautified. We hear nothing more, however, of the monks. They disappeared at the first approach of the Mohammedans, and were no more seen. Except for the invasion, in 1244, by the Chorasmians (or Kharizmians; see KHIVA), then followed a period of peace for the country. It was also a period of continual pilgrimages. Men from all parts of western Europe visited the country, and knelt weeping at the places which had seen the sufferings of the Lord. And year by year while men related how these places where miracles were wrought daily were in the hands of the infidels, who cursed and reviled the Christian pilgrims, the indignation grew until the world was ripe for the Crusades.

The Latin kingdom of Jerusalem began in the year 1099, and lasted less than a hundred years, except in name. But it took two hundred years before the Christians were finally driven from the coast of Syria, and longer than that before the

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great idea of the Crusades (q.v.) finally faded out of men's minds, and ceased to be a factor in European politics.

For five hundred years Palestine has been so far happy that she has contributed little to the history of the world. The Turk succeeded the Saracen; there has been no progress till the present generation; the ruins have become more ruinous; pashas come and go; the people are oppressed with taxes; the young men are taken for soldiers, and they never come back; but the country has been for the most part in peace.

II. *Physical Description of the Holy Land.*—Palestine proper contains an area of about 6000 sq. m. It is bounded on the N. by the river Kasimîyeh (the 'divider'), which is never mentioned at all in the Bible; on the E. by the Jordan, and on the W. by the sea. At first sight the map shows ridge upon ridge of hills running east and west, sloping gradually to the west, and descending steeply to the east. On the west is a long strip of low seaboard varying in breadth, vanishing altogether at the foot of Carmel, and broadening southward into the Plain of Philistia. The Bible speaks of the country as consisting of desert, mountain, plain, low hills (Shephelah), and valley. In North Galilee the watershed runs at an average height of 2800 feet above the sea, while the highest peak rises to a height of 3934 feet. In Samaria the hills are lower, not rising above 3000 feet, while south of Jerusalem the hills again rise to over 3300 feet. The north country contains the Plains of Buttauf and the rich plain of Esdraelon, 20 miles long and 9 miles broad, elevated, at its highest point, 250 feet above the sea. The principal elevations in the country are Jebel Jermûk, 3934 feet; Carmel, 1740 feet high and 12 miles long; Mount Ebal, 3084 feet, and Mount Gerizim, 2849 feet; Tell Asûr, 3318 feet; and Râs esh Sherifeh, 3258 feet, the only known spot whence the Dead Sea and Mediterranean Sea are visible. The Maritime Plain, formed partly by the denudation of the mountains and partly by accumulation of sand, possesses a fertile soil; deep gullies run across it, with, in some cases, perennial streams. The Jordan Valley begins with the rise of the stream 1000 feet above the Mediterranean, and in 100 miles has fallen to 1292 feet below the Mediterranean. This is a drop of nearly 2300 feet, or 23 feet in a mile. The valley itself varies in width from 5 miles, where it begins, to 13 miles in the Plain of Jericho. The country terminates southward with the Jeshimon, the 'Solitude' of the Old Testament or the 'Wilderness of Judæa' of the New, a plateau of white chalk rising in cliffs 2000 feet high above the Dead Sea.

Palestine is poorly supplied with rivers. The following, large and small, flow into the Mediterranean: The Nahr Mefshukh, Nahr Namein (the Belus), Nahr el Mukatta (the Kishon), Nahr el Zerka, Nahr el Mefjir, Nahr Iskanderûneh, Nahr el Fâlik, Nahr el Aujeh, Nahr Rubîn, Nahr Sukereir. The following are the sources of the Jordan: Nahr Bareighît, Nahr el Hâsbany, Nahr el Leddân, Nahr Banias. On the eastern side, not counting a few winter rills which run into the Sea of Galilee, there are the Nahr Yarmuk, Nahr Rukkad, Nahr Zerka (the Jabbok), Nahr Zerka Mâ'aîn, and Nahr Mojib (the Arnon). Those which flow into the Jordan on the west side are Nahr Jalûd and Nahr Far'ah. The country is not, therefore, plentifully supplied with streams. On the other hand, it is a country abounding in springs. The three lakes of Huleh, Galilee, and the Dead Sea are its only lakes.

The climate of Palestine is extremely hot in summer, when the temperature reaches 100° F., and in winter it is wet and cold, though frost does not occur on the plains. There are heavy dews. The 'former rain' and the 'latter rain' are those which occur at autumnal and vernal equinoxes.

The fauna and flora of Palestine have been treated exhaustively by Canon Tristram. The distinctive trees of the country are the terebinth, the olive, the cedar, and the sycamore. The shittim-wood is supposed to have been the acacia. The vine of Sodom is the osher, which has a fruit like a lemon, containing pith. The rose of Sharon is a white narcissus; and the lily of the valley is the blue iris.

Many of the names of creatures mentioned in the Bible have been so translated in the old version as to convey quite a false impression. Thus, the 'unicorn'—*rim*—was a species of wild-ox now extinct. This is shown by the Assyrian basreliefs. The 'hart' is the fallow-deer; the 'coney' is not the rabbit, but the Syrian hyrax; the 'leopard' is the cheetah; the 'fox' is the jackal; the 'mouse' is the jerboa; the 'weasel' is the mole-rat; the 'badger' is the porpoise. The leviathan is probably the crocodile, still found in one or two of the rivers. The wild-goat—*ibex*—is still found in large herds in the southern wilderness; the lion is extinct; the bear lingers in the mountains; the hyæna is common; the wolf is rare; the dog is an unclean creature living in the outskirts of towns, and feeding on garbage. Of birds, many mentioned in the Bible cannot be identified. All those which can be identified are still to be found. Of insects, the locust still devastates the crops; the grasshopper still serves for food; the hornet and the wasp are still regarded with terror; and the worship of the 'lord of flies' is still explained by the multitudes of those insects in the lowlands.

Geology.—In no other country are the physical features more indicative of the geological structure than in Palestine; and every student of the history of this remarkable country will recognise the important bearing which these features have had on the political and religious history of its inhabitants. The region is physically divisible into four parts: (1) The maritime district, extending along the shore of the Mediterranean, and including Philistia; (2) the central tableland or 'hill-country' of Judæa, culminating in the Lebanon towards the north and spreading out into the great plain of the Badiet-et-Tîh in an opposite direction; (3) the depression of the Jordan Valley and Dead Sea, separating Eastern from Western Palestine; and (4) the tableland of Edom, Moab, and the region of Trachonitis to the east of the Jordan Valley, bounded by an abrupt and lofty escarpment, and stretching away towards the east into the Desert of Arabia. Taking these divisions in the order here stated, their geological structure may be briefly described as follows:

(1) The maritime district, having an average elevation of about 200 feet above the sea, is formed of marls, sand, and gravel, with shells belonging to species now living in the adjoining seas. These deposits are, in fact, the upraised sea-beaches belonging to geologically recent times, and indicate considerable physical changes at a period partially prehistoric. These littoral deposits rest upon calcareous sandstones of perhaps Miocene age, which terminate inland along the borders of the central tableland. (2) This latter is composed of limestones and marls, of Cretaceous and Eocene age, with bands of marl and layers or nodules of chert; the whole having a thickness of about 3500 feet. The beds rise from beneath the calcareous sandstone of Philistia, and form a vast crenelated arch, the central axis of which passes in a meridional direction under the summit of the tableland, where the strata are nearly horizontal; and upon which are the sites of Nablûs, Jerusalem, Bethlehem, and Hebron. Fossils in these strata

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are only locally abundant, but are quite sufficient to enable us to refer the beds either to the Cretaceous or Eocene periods. (3) The great depression of the Jordan Valley and Dead Sea, known as the Ghôr, lies along the line of a great fault, or dislocation of the strata, owing to which the strata do not correspond to each other on opposite sides of the valley, but are vertically displaced; being let down on the west and elevated along the east. The fault has been traced southwards along the eastern margin of the Wâdy-el-'Arabah, and in Palestine its position is marked by the abrupt uprising of the tableland along the eastern side of the Jordan Valley and the Ghôr. The valley itself on either side is often diversified by terraces of marl, sand, and gravel, with lacustrine or fluviatile shells, and of rock-salt along the western margin of the Dead Sea. These terraces are at various levels above the present waters of the valley, and reach to a height of about 1200 feet above the Dead Sea surface in the 'Arabah Valley. As they are clearly lake-deposits they indicate that the waters of the Dead Sea once rose to a level of 1200 feet higher than at present, thus forming a lake which must have had a length of 120 miles from north to south, embracing the Sea of Galilee and the Jordan as far as the lake of Huleh. The remarkable promontory called El Lissan (or 'The Tongue'), which juts out into the Dead Sea from the base of the Moabite escarpment, as well as the corresponding terrace of rock-salt capped by gypseous marl on the west side of the Dead Sea, are portions of a once continuous bed of this more ancient and vastly more extensive inland lake. (4) Along the east of the Jordan Valley and Dead Sea the base of the Cretaceous limestone is seen reposing upon variegated sandstone, known as the 'Nubian Sandstone' of Lower Cretaceous age; and this again on various crystalline rocks, such as granite, gneiss, porphyry, and schist, of great geological antiquity. Of these rocks the flanks of the Edomite Mountains are composed, as well as those forming the Sinaitic peninsula. In the valley of the Nile the same series reaches the surface at the First Cataract, and is seen to pass below the Nubian sandstone. Everywhere these crystalline rocks are the foundation of all the geological formations of this region, and have been referred to the Archæan or Laurentian period. The Cretaceous and Eocene limestones form the surface of the tableland of Edom and Moab, and extend eastwards under the great elevated plain of the Arabian Desert, a counterpart of the Libyan Desert west of the Nile. From the neighbourhood of Kerak northwards these limestone strata are intersected or overlaid by dykes and sheets of basalt, which form the region of Trachonitis east of the Sea of Galilee, and which have been poured forth from volcanic vents and fissures in the region of the Haurân. Some of the volcanic cones and vents are remarkably perfect and fresh—resembling those of the Auvergne region in central France, both having been developed in Post-Tertiary times; and it is not improbable that some of the hot springs which issue forth along the line of the Jordan owe their high temperature to the proximity of the underground waters to the still heated masses of lava beneath the surface.

In the Lebanon and Hermon the Cretaceous and Tertiary limestones are thrown into numerous flexures, and are repeated by successive faults, amongst which the most important is the prolongation of the Jordan Valley fault, which, judging from indications which have been observed, appears to be continued along the valley of the Orontes.

III. *The Exploration of the Country.*—The stream of pilgrims to the Holy Land began in the 2d century, and has never since then ceased. This stream rose to its highest flood in the century before the Crusaders, when the Mediterranean was covered with ships conveying the pilgrims to the shores of the Holy Land, and the roads were black with the troops of those who walked or rode through Europe and across Asia Minor. Those of them who returned in safety told what they had seen. Some of them wrote descriptions of the Holy Land. Thus, in the 4th century, a pilgrim from Bordeaux, who visited the country when Constantine's basilica was being built, wrote an account of his journey. In the same century Eusebius produced an *Onomasticon* or gazetteer of the Holy Land. Later on Jerome, Eucherius, Theodorus, Antoninus Martyr, Procopius, before the Mohammedan conquest, wrote accounts of the country and of Jerusalem. After the conquest the pilgrims were allowed to come and go unmolested. Arculphus, Willibald, Bernard, and others have left descriptions which belong to the 7th, 8th, and 9th centuries. Moreover, the Moslems themselves began to write. About 985 El Mukaddasi, 'the man of Jerusalem,' described the whole of Syria. A few years later Nâzir-i-Khusrau wrote an account of his journey from Balkh, through Armenia and Palestine to Cairo, thence to Mecca, through Persia, and so back to his native town. The Crusaders have left copious accounts of their wars, their occupations, and their customs, while the descriptions and narrations of pilgrims who wrote in Latin, French, Russian, Greek, Hebrew, Persian, and Arabic throw floods of light on the country of this time. Maps began to be made; they lack the accuracy of later geographers, but they convey instruction as regards the land and its physical features, which is correct so far as it goes. Thus, the map of Marino Sanuto indicates the hill-country, the mountains of Libanus, the River Jordan, the Dead Sea, and the Sea of Galilee, and places the towns with a reasonable degree of accuracy. Palestine, therefore, though never explored, was tolerably well known to the world, as well known as Italy was formerly to the French or the Low Countries to the English. Modern exploration, with fuller knowledge of what was wanting, began in the 19th century with Seetzen, Burckhardt, Buckingham, Irby and Mangles, Tobler, De Saulcy, Van de Velde, and Williams.

The researches of Robinson and the immense additions made by him in the field of Biblical geography in the years 1838-52 forced upon the world the necessity for an exhaustive survey of the country. Robinson demonstrated the existence everywhere of ruined towns and hill-forts in which were preserved the long-lost names of Bible places. It became certain that a triangulation of the country, such as that of the Ordnance Survey of Great Britain and Ireland, which should leave not a corner of country, not a single hillock, unexplored, would be fruitful in results, and would furnish a map of such accuracy as to require no more books of travel for the elucidation of geographical points. Thus, the physical features of the country were already known in general terms, but the details were mostly unknown; while even the curious footsteps of Robinson had left whole tracts of country totally unexplored. The foundation of the Palestine Exploration Fund (1865) was the first step taken in this new direction; but it shows how little the necessity for such a survey was impressed upon the minds even of its founders that they began, after a preliminary journey under Captain (Colonel Sir Charles) Wilson, by excavations in Jerusalem under Lieutenant (Colonel Sir Charles) Warren. It seemed at the moment more important to settle, if possible, the site of the temple than to make clear and intelligible the whole of the Bible narrative. For this and nothing short of this has been the result of the survey. This survey

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has now been executed, chiefly by Major Conder, R.E., whose name will be indelibly associated with a work which has done so much for the right understanding of the Bible in the version into English. The whole of Western Palestine is now mapped on a scale which includes every ruin as well as every spring, every watercourse, every wood, and every hillock. At least 150 lost biblical sites have been recovered; by means of these the boundaries of the tribes can now be laid down; one-fourth only of the Bible names remain to be identified. The topography of Josephus, of the Talmud, of the pilgrims, and of the chroniclers has also been illustrated and recovered. All important heights have been ascertained; the levels of the Dead Sea and the Sea of Galilee are laid down; all the remaining ruins have been planned and drawn; the various forms of rock sepulture have been examined and classified; the rude stone monuments have been marked and planned; for the first time the route of invading armies can be followed, and the strategic art of the captains can be understood; native customs have been gathered; the seasons, the climate, the fauna and flora, the monuments, the inscriptions, the ethnology of the country and its people have all been collected. These things bring floods of light to bear upon the understanding of the Scriptures. Formerly the study of the Bible was confined to the books themselves and to the literature of exegesis which had gathered round those books. To this method we owe the immense mass of writings on the Bible, books which fill the greater part of our libraries, books of profound erudition from which scarcely anything can be gleaned for the instruction of the people. Now, however, there are new methods. We approach the Bible armed with coins, with inscriptions in cuneiform, in hieroglyphics, in Hebrew, Arabic, and in Greek; we have inscribed monuments, such as the Moabite Stone, the Siloam inscription, the stone of the temple; we have a map of the country accurate and exhaustive, a possession for all time, which will never need to be done again; we have measurements and plans of all the ruins; we have traditions, legends, languages, customs; we have, besides, for those who come after us, a great collection of inscriptions in unknown characters containing one knows not what ancient history. Lastly, which must not be omitted, everything which has been found, or which has been achieved, in the direction of scientific exploration goes to prove the literal exactness of the historical portions of the Old and New Testament.

The present condition of the country shows the beginning of rapid changes in every direction. The Survey of Palestine was undertaken not a day too soon. In a very few years the ruins which have been figured by the surveyors, and so, in a sense, preserved for ever, will have vanished under the destructive hands of Change. The thousands of visitors who every year pour into the country contribute in no small degree to alter the character, the habits, and the ideas of the people; roads are being everywhere constructed in a country where up till a few years ago there were no roads. The traveller can now drive from Jaffa to Jerusalem, from Jerusalem to Jericho, from Jerusalem to Hebron, and from Haifa to Tiberias. A railway is in construction between Jaffa and Jerusalem; plans and surveys of another from Haifa to Damascus, by way of Nazareth, are also ready; and there is now a hotel at Jericho. As regards Jerusalem, a new town has sprung up outside the walls; the Russians have buildings there which, on occasions, would serve for fortresses; the Jews are flocking into the city—it is rumoured that there are now close upon 50,000 Jews in and about the Holy City; the Mount of Olives is being covered with buildings. There are Jewish colonies between Ramlah, Lydda, and Jaffa; there are German colonies in the same region; Circassians occupy Ammân, and are settling in the Haurân; the people from the Lebanon are coming down from their hills and covering the country east of the Jordan. In fact, those who wish to see Palestine as it has been for a thousand years and more must go at once or they will never have the chance.

BIBLIOGRAPHY.—The books published on Palestine are far too numerous to be set down. But the Survey has rendered most of them practically useless. All the books of travel of modern times may now be neglected; their results are embodied in the Survey. The *Survey of Western Palestine* consists of eight volumes—viz. vols. i. to iii. Memoirs, by Captain Conder and Captain Kitchener, with plans and drawings of most of the ruins; Jerusalem, by Sir Charles Warren and Captain Conder, with a portfolio of sixty sheets illustrating the excavations; the Fauna and Flora, by Canon Tristram; a volume of special papers on various subjects connected with the Survey; the Name-lists, containing all the names in Arabic with the English transliteration and the translation; and the Geology of Western Palestine, by Professor Edward Hull, F.R.S.; to which is added an index in one volume. The *Survey of Eastern Palestine* has been advanced one volume only. These volumes contain the facts necessary for the student. Should he only want the popular results he may read the works of Major Conder, *Tent-work in Palestine, Heth and Moab, Syrian Stone-lore*, or that of Mr H. A. Harper, entitled *The Bible and Modern Discoveries*. An excellent résumé of the Survey and of recent research is also contained in Conder's *Palestine*. A collection of early pilgrims is in course of publication by the Palestine Pilgrims' Text Society. The publications of the Société de l'Orient Latin may also be consulted. *Palestine under the Moslems*, by Guy le Strange (Palestine Exploration Fund), gives the world for the first time an historical and geographical account of the country compiled exclusively from Moslem writers. See also Fritz Burckhardt, *Reisen in Syrien und Palestina*; Oscar Fraas, *Aus dem Orient*; E. Hull, *Physical Geology and Geography of Arabia Petræa, Palestine, &c.* (Mem. Palestine Exploration Soc. 1880); Louis Lartet, *Voyage d'Exploration à la Mer Morte*; Canon Tristram, *Land of Israel* (2d ed. 1872). See, too, the article JERUSALEM, and works cited there; also JEWS, TEMPLARS.

Palestine, capital of Anderson county, Texas, 151 miles by rail N. of Houston. It manufactures brass and iron goods, and has a pop. (1890) of 5834.

Palestrina, the ancient *Prænestе*, an Italian city, 22 miles E. by S. of Rome, on the slope of an offset of the Apennines, contains the chief castle of the Colonnas and the palace of the Barberini family, the owners after 1630. It is built almost entirely upon the gigantic substructions of the ancient Temple of Fortune, one of the greatest religious edifices in all Italy, celebrated not only for its splendour, but also for its oracle, which was consulted down to the time of Constantine. Portions of the ancient wall—Cyclopean blocks of limestone—still remain. Prænestе was a member of the Latin League, until in 499 B.C. it joined the Romans. Yet it took a prominent part in the Latin war (340-338 B.C.) against Rome. Having given shelter to the younger Marius in 82 B.C., it was taken and sacked by Sulla. Its elevated and healthy situation, at no great distance from the capital, made it a favourite summer-resort of the Romans. Augustus and Tiberius frequented it; Horace found it a pleasant retreat; Hadrian built there an extensive villa; and Antoninus erected a palace. Numerous valuable works of art and other remains have been recovered, dating principally from the 8th, and from the 3d and 2d, centuries B.C., the former showing Phœnician influence, the latter being Roman. Pop. 5855.

Palestrina, GIOVANNI PIERLUIGI DA, the greatest of Italian musical composers, was born at

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Palestrina in 1524. He studied music at Rome under Goudimel, and in 1551 was made *maestro di capella* of the Julian Chapel of St Peter's by Pope Julius III. In 1554 he published a collection of Masses, which the pope so highly approved of that he appointed their composer one of the singers of the Sixtine Chapel. Being a married man, he lost that office on the accession to the pontificate of the severer Paul IV. But in 1555 he was made choir-master of the Lateran, and in 1561 was given the similar post in St Maria Maggiore, and held it till 1571, when he was restored to his office in the Julian Chapel. The Council of Trent, having undertaken to reform the music of the church, entrusted to Palestrina the task of remodelling this part of religious worship. He composed three masses as examples of what could be done; one of them, the Mass of Pope Marcellus (to whose memory it is dedicated), saved music to the church by establishing a type infinitely superior, in its blending of devotional with artistic feeling, to anything that had preceded it, a type which, amid all the changes that music has since gone through, continues to attract admiration. Palestrina must be considered the first musician who reconciled musical science with musical art, and his works form a most important epoch in the history of Music (q.v.). He died in the arms of St Philip Neri on 2d February 1594. His compositions, very numerous, are all sacred, except two volumes of Madrigals; they have been published at Leipzig (1868 *et seq.*). The authoritative Life was written by the Italian Baini (Rome, 1828).

Paley, FREDERICK APTHORP, classical scholar, grandson of the author of the *Evidences*, was born at Easingwold, near York, in 1816. He had his education under Dr S. Butler at Shrewsbury, and at St John's College, Cambridge, but, not obtaining mathematical honours, by the regulations of the time was shut out from the classical tripos, and likewise did not obtain a fellowship. He resided, however, at Cambridge till his conversion to the Roman Catholic faith in 1846, and later from 1860 till 1874, when he was appointed professor of Classical Literature at the abortive Roman Catholic college at Kensington. He next went to live at Bournemouth, was twice classical examiner to London University and for the classical tripos at Cambridge, and continued till the sudden close of his life (11th December 1888) his arduous labours in classical scholarship. In early life at Cambridge he helped to found the Camden Ecclesiological Society, and published books on Gothic architecture; but the important work of his life began in 1844 with the first part of his edition of Æschylus with Latin notes. He re-edited Æschylus for the 'Bibliotheca Classica,' as well as Euripides, Hesiod, the *Iliad*, and completed the *Sophocles* of Mr Blaydes, all for the same series; and also prepared minor editions of similar works, or parts of these, for the 'Cambridge Texts' series. His *Propertius*, Ovid's *Fasti*, and *Martial* were less successful; but his three comedies of *Aristophanes*, *Theocritus*, and his *Select Private Orations of Demosthenes* (in conjunction with Dr Sandys) were recognised as works of the very highest value. He published prose translations of the *Philebus* and *Theætetus* of Plato, the 5th and 10th books of Aristotle's *Ethics*, the *Odes* of Pindar, and the *Tragedies* of Æschylus, and renderings in verse of the 5th book of *Propertius* and *Fragments of the Greek Comic Poets* (1888). Other works were a treatise on *Greek Particles* (1881), *Greek Wit* (1881), and an unsatisfactory edition of the *Gospel of St John* (1887). Paley received the degree of LL.D. from Aberdeen in 1883. A sagacious textual critic and sound exegete, he left behind him traditions of a high type of scholarship, of the age when yet scientific philology was not, and German might be neglected. In his later years he adopted a late date for Homer.

Paley, WILLIAM, a celebrated English divine, was born at Peterborough, son of a minor canon of the cathedral, in 1743. His family belonged to the West Riding of Yorkshire, and not long after his birth his father returned to his native parish of Giggleswick to become master of the grammar-school there. In 1759 he entered Christ's College, Cambridge, as a sizar, and led for the first two years an idle and dissipated life, but thereafter became a severe student, and in 1763 came out senior wrangler. After three years as an assistant-master at Greenwich, he was elected in 1768 a fellow and tutor of Christ's College, and here he lectured on moral philosophy till his marriage in 1776 and presentation to the rectory of Musgrove in Westmorland and the vicarage of Dalston in Cumberland, which were soon exchanged for the more profitable living of Appleby. In 1780 he was collated to a prebendal stall in Carlisle Cathedral, in 1782 he became archdeacon, and in 1785 chancellor of the diocese. In the latter year he published his *Principles of Moral and Political Philosophy*, for which he received £1000. In this work he propounds his ethical theory—a form of what is usually known as utilitarianism. He begins by adducing a series of strong objections against the popular doctrine of the *moral sense*, next takes up the question of the source of obligation, and resolves it into the will of God, enforced by future punishment, it being admitted candidly that virtue is prudence directed to the next world. The will of God, in so far as it is not rendered explicit by revelation, is to be interpreted by the tendency of actions to promote human happiness, the benevolence of the Deity being assumed. Objection may fairly be taken to the principles on which Paley rests his system, but the lucidity and appositeness of his illustrations are beyond all praise; and if his treatise cannot be regarded as a profoundly philosophical work, it is at anyrate one of the clearest and most sensible ever written, even by an Englishman. In 1790 appeared his most original work, *Horæ Paulinæ*, the aim of which is to prove, by a great variety of 'undesigned coincidences,' the great improbability of the common hypothesis of the unbelief of that day, that the New Testament is a cunningly devised fable. It was followed in 1794 by his famous *View of the Evidences of Christianity*, in which dexterous use is made of Lardner's *Credibility* and Bishop Douglas' *Criterion of Miracles*. The treatment is on the historical method, flanked by *auxiliary* arguments drawn from the superior morality of the gospel, the originality of Christ's character, and the like. But the bases of controversy have now entirely shifted, and the work, able as it is, is no longer, even at Cambridge, regarded adequate as a defence. The champion of the faith was splendidly rewarded. The Bishop of London gave him a stall in St Paul's; shortly after he was made subdean of Lincoln, with £700 a year; Cambridge conferred on him the degree of D.D.; and the Bishop of Durham presented him to the rectory of Bishop Wearmouth, worth £1200 a year. Perhaps his latitudinarianism and essentially unspiritual temperament, as well as such homely sarcasms as comparing the 'divine right of kings' with the 'divine right of constables,' may have hindered him from yet higher preferment. After 1800 he became subject to a painful disease of the kidneys, yet in 1802 he published perhaps the most widely popular of all his works, *Natural Theology, or Evidences of the Existence and Attributes of the Deity*, largely based on the *Religious Philosopher* of Nieuwentyt, a Dutch disciple of Descartes. An excellent edition is that by Lord Brougham and

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Sir Charles Bell (1836–39). Paley died May 25, 1805.

A complete edition of his works was published by one of his sons, the Rev. Edmund Paley (7 vols. 1825); later editions are those by Wayland (5 vols. 1837) and Paxton (5 vols. 1838). The best biography is that by G. W. Meadley (Sunderland, 1809); and see Leslie Stephen, *English Thought in the Eighteenth Century* (1876).

Palghat, a town of Malabar district, 68 miles SE. of Calicut by rail. Its old fort was of great strategic importance during the wars with Hyder Ali and Tippoo Saib. Pop. (1881) 36,339.

Palgrave, SIR FRANCIS, historian, was born in London in July 1788, the son of Meyer Cohen, a Jewish stockbroker. He was privately educated, and showed a quite remarkable precocity, having at eight translated into French a Latin version of the *Battle of the Frogs and Mice*, which his father printed in 1797. His father's fortunes failing in 1803, he was articled as a solicitor's clerk, and here he remained until 1822, when he took chambers in the Temple and was employed under the Record Commission. On his marriage (1823) he assumed his mother-in-law's maiden name of Palgrave. He was called to the bar in 1827, and soon acquired considerable practice in pedigree cases before the House of Lords. As early as 1818 he had edited a collection of Anglo-Norman *chansons;* in 1831 he contributed a *History of England* to the 'Family Library;' and in 1832 he published his *Rise and Progress of the English Commonwealth*, also *Observations on the Principles of New Municipal Corporations.* The same year he was knighted. From 1833 to 1835 he served on the Municipal Corporation Commission, and in 1838, on the reconstruction of the Record Service, he was appointed deputy-keeper of Her Majesty's Records, an office he held till his death at Hampstead, 6th July 1861.

Besides the works already mentioned, Palgrave edited for the government the following: *Calendars of the Treasury of the Exchequer* (3 vols. 1836), *Parliamentary Writs* (1830–34), *Rotuli Curiæ Regis* (1835), *Ancient Kalendars and Inventories of the Treasury of Her Majesty's Exchequer* (1836), and *Documents and Records illustrating the History of Scotland* (1837). In his private capacity he produced the *Merchant and the Friar* [Marco Polo and Friar Bacon], and a learned and still valuable *History of Normandy and of England* (4 vols. 1851–64).

Palgrave, FRANCIS TURNER, a gifted poet and critic, eldest son of the preceding, born in London, September 28, 1824. He was educated at Charterhouse School, became scholar of Balliol College, Oxford, and Fellow of Exeter, filled for five years the office of vice-principal of the Training College for Schoolmasters at Kneller Hall, and afterwards was private secretary to Earl Granville, and an official in the Educational Department of the Privy-council. He succeeded Shairp as professor of Poetry at Oxford in 1886, and is a contributor to the present work. His works are *Idylls and Songs* (1854), *Essays on Art* (1866), *Hymns* (1867), *The Five Days' Entertainments at Wentworth Grange* (1868), *Lyrical Poems* (1871), and the *Visions of England* (1881). He is best known, however, as the editor of the admirably selected *Golden Treasury of English Lyrics* (1861); *The Children's Treasury of Lyrical Poetry* (2 vols. 1875); *The Sonnets and Songs of Shakespeare* (1877); *Selected Lyrical Poems of Herrick* (1877), *of Keats* (1885); and *Treasury of Sacred Song* (1889).

WILLIAM GIFFORD PALGRAVE, another son of Sir Francis, born in Westminster, January 24, 1826, was educated at the Charterhouse School and Trinity College, Oxford, graduating with great distinction in 1846. Next year he obtained a commission in the Bombay Native Infantry, which, however, he soon resigned to become a priest in the Society of Jesus. After a course of study at Laval in France and at Rome he was sent at his own request as a missionary to Syria, where he acquired a wonderfully intimate knowledge of Arabic. Summoned to France in 1860 by Napoleon III. to give an account of the Syrian massacres, he went disguised as a physician on a daring expedition at the emperor's expense through central Arabia, traversing the entire Wahabi kingdom, and returning to Europe through Bagdad and Aleppo (1862–63). With the consent of the emperor, he published his *Narrative of a Year's Journey through Central and Eastern Arabia* (2 vols. 1865), one of the best books of travel in the English language. Palgrave quitted the Society of Jesus in 1864, and was sent by the British government in 1865 to treat for the release of Consul Cameron and the other captives in Abyssinia. He was nominated consul at Sukhum-Kalé in 1866, at Trebizond in 1867, at the island of St Thomas in 1873, at Manila in 1876, and consul-general in the principality of Bulgaria in 1878, and in Siam in 1880. He was appointed British minister to Uruguay in 1884, and died at Monte Video, September 30, 1888. His other works are *Essays on Eastern Questions* (1872); *Hermann Agha: an Eastern Narrative* (2 vols. 1872); *Dutch Guiana* (1876); and *Ulysses, or Scenes and Studies in Many Lands* (1887).

Páli, the sacred language of the Buddhists (see INDIA, Vol. VI. p. 102). Páli ceased to be a living language of India when Buddhism was rooted out of it; it was carried by the fugitive Buddhists to other countries, especially Ceylon, Burma, and Siam; but in these countries, too, it had to give way before the native tongues, in which the later Buddhist literature was composed. See the Páli grammars of Minayeff (St Petersburg, 1872; Eng. trans. Maulmain, 1882), Kuhn (1875), and Müller (1885); Childers's *Páli Dictionary* (1875), and Frankfurter's *Páli Handbook* (1882).

Páli, the commercial capital of Jodhpur (q.v.), 45 miles by rail SE. of Jodhpur city.

Palikao, a place on the canal between Peking and its port on the Peiho. Here in 1860 was fought an engagement between the Anglo-French troops and the Chinese, and hence the French general, Cousin-Montauban (1796–1878), who was minister of War in August and September 1870, received his title of Count Palikao.

Palikars, a name for the Arnatoles (q.v.).

Palimpsest. See PALÆOGRAPHY.

Palindrome (Gr. *palin*, 'backwards,' and *dromos*, 'a running'), the name given to a kind of verse very common in Latin, the peculiarity of which is that it may be read the same backwards as forwards. A few examples will suffice.

Si bene te tua laus taxat sua lautè tenebis.
Et necat eger amor non Roma rege tacente,
Roma reges una non anus eger amor.

A Greek palindrome, sometimes inscribed on English fonts (e.g. Hadleigh and Worlingworth, in Suffolk), runs: Νίψον ἀνόμημα μὴ μόναν ὄψιν ('Wash my sin, and not my face only'). A Roman lawyer gets the credit of *Si nummi immunis*, which Camden translates 'Give me my fee, and I warrant you free.' It is said that in the reign of Queen Elizabeth a certain lady of rank, having been compelled to retire from the court on account of some *fama*, the truth of which she denied, took for her motto: *Ablata at alba*, 'Retired but pure.' The English language has few palindromes, but one at least is inimitable. It represents our first parent politely introducing himself to Eve in these words: 'Madam, I'm Adam.' Compare Henry B. Wheatley's book

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on *Anagrams* (1862); G. R. Clark, *Palindromes* (Glasgow, 1887).

Palinurus, the helmsman of Æneas, was lulled to sleep at his post, and fell into the sea. When Æneas visited the lower world he related to him that on the fourth day after his fall he made the coast of Italy, and was there barbarously murdered, and his body left unburied on the strand. The Sibyl prophesied that his death should be atoned for, a tomb erected to him, and a cave (Palinurus, the modern *Punta della Spartivento*) named after him.

Palisander Wood, a name sometimes given to Rosewood (q.v.).

Palissy, BERNARD, the great French potter, was born about 1509 in the diocese of Agen, and, after wandering for ten or twelve years all over France as a glass- and portrait-painter, about 1538 married and settled at Saintes. There he employed himself also as a land-surveyor, when the chance sight of an enamelled cup made him resolve to discover how to make enamels. So, neglecting all else, he devoted himself to experiments for sixteen years, by which time he had exhausted all his resources, and, for want of money to buy fuel, was forced to burn the tables and the flooring of his house. His neighbours, even his wife, mocked at him; his children cried to him for food; but in spite of all these discouragements he persisted, and was at length rewarded with success (1557). His ware, bearing in high relief plants and animals, coloured to represent nature, soon made him famous; and, though as a Huguenot he was in 1562 imprisoned at Bordeaux, he was speedily released by royal edict, and appointed 'inventor of rustic figulines' to the king. Removing to Paris in 1564, he established his workshop at the Tuileries, and was specially exempted by Catharine de' Medici from the massacre of St Bartholomew (1572). During 1575–84 he delivered a course of lectures on natural history and physics, and was the first in France to substitute facts for fancies, as also to give right notions of the origin of springs, the formation of fossil shells, the fertilising properties of marl, and the best means of purifying water. In 1585 he was again arrested as a Huguenot, and thrown into the Bastille, where he died in 1589. Palissy's writings, published between 1557 and 1580, and edited by M. France (Paris, 1880), possess much interest; but the man himself is more interesting still, brave, ardent, sincere, a mixture of Columbus and John Bunyan.

See H. Morley's *Palissy the Potter* (2 vols. 1852), and the Lives in French by Audiat (1868) and Berty (1886).

Paliurus, a genus of trees and shrubs of the natural order Rhamnaceæ, nearly allied to Zizyphus (see JUJUBE), but very different in the fruit, which is dry, orbicular, and girded with a broad membranous wing. *P. aculeatus* is often called Christ's Thorn, and by the Germans Jews' Thorn (*Judendorn*), from the fancy that it supplied the crown of thorns with which our Saviour was crowned. It is a deciduous shrub or low tree, with slender, pliant branches and ovate three-nerved leaves, each of which has two sharp spines at the base, one straight and the other re-curved. It is a native of the countries around the Mediterranean, of India, and many parts of Asia. It is often used for hedges in Italy and other countries, its sharp spines and pliant branches admirably adapting it for this purpose.

Palk Strait, the northern portion of the shallow passage between the south coast of India and the island of Ceylon (q.v.).

Palladio, ANDREA, Italian architect, was born at Vicenza, 30th November 1518. After studying the writings of Vitruvius and the monuments of antiquity at Rome, he settled in his native city, and soon acquired a high reputation throughout the country from his designs for numerous buildings in Vicenza and the neighbourhood. He is the most conspicuous of the architects who, following Brunelleschi, led the way in establishing the modern Italian school of architecture, as distinguished from the earlier Italian Style (q.v.) of the Renaissance. His style, known as the Palladian, is modelled on the ancient Roman as apprehended by Vitruvius, reproducing its dignity and strict proportions, but often to the neglect of usefulness; and his buildings are constantly encumbered by a superfluity of pilasters and columns, broken entablatures, and inappropriate ornament, even where there is real beauty of detail. The palaces Barbarano, Della Ragione, Chierigati (now the Museo Civico), Tiene, and the Olympic theatre at Vicenza; the country mansions of Capra, Maser, and Rotunda in the vicinity; and the churches of San Giorgio Maggiore and Il Redentore, the façade of San Francesco della Vigna, and several palaces, in Venice, are his greatest achievements. He died at Vicenza, 19th August 1580. Palladio wrote a work on architecture (*I quattro Libri dell' Architettura*, 1570, and often reprinted) which had a great influence upon the styles of his successors, especially upon Inigo Jones, the 'English Palladio,' whose notes on the book are published in Leoni's Eng. trans. (1715). The term Palladian was, indeed, long practically synonymous with the beautiful and perfect in architecture. Recent Lives (in Italian) are those by Zanella (1880) and Barichella (1880).

Palladium, among the ancient Greeks and Romans, an image of Pallas, who was generally identified with Athena (q.v), upon the careful keeping of which in a sanctuary the public welfare was believed to depend. The Palladium of Troy was especially famous, and was the gift of Zeus to the founder of Ilium. It has been supposed it may have been originally a meteorite (see METEORS). Ulysses and Diomede stole the Palladium, and so helped to secure victory for the Greeks; and both Athens and Argos boasted to have afterwards secured the possession of the charm.

Palladium (sym. Pd, atom. wt. 106·2, sp. gr. 11·4) is one of the so-called noble metals, which in its colour and ductility closely resembles platinum. It is not fusible in an ordinary wind-furnace, but melts at a somewhat lower temperature than the last-named metal; and, when heated beyond its fusing-point, it volatilises in the form of a green vapour. It undergoes no change in the open air at ordinary temperatures; but at a low red heat it becomes covered with a purple film, owing to superficial oxidation. It is soluble in nitric and iodic acids, and in aqua regia. It combines readily with gold, which it has the property of rendering brittle and white. (When it forms 20 per cent. of the mass the alloy is perfectly white.) When alloyed with twice its weight of silver it forms a ductile compound, which has been employed for the construction of small weights; but for this purpose aluminium is superior. Professor Miller states that it 'has been applied in a few cases to the construction of graduated scales for astronomical instruments, for which, by its whiteness, hardness, and unalterability in the air, it is well adapted;' its scarcity must, however, prevent its general use for this purpose.

It was discovered in 1803 by Wollaston in the ore of platinum, of which it seldom forms so much as 1 per cent. Another source of this metal is the native alloy (termed *ouro poudre*) which it forms with gold in certain mines in Brazil; it is from this alloy that the metal is chiefly obtained.

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Palladium forms with oxygen a protoxide, PdO, which is the base of the salts of the metal; a binoxide, PdO_2; and according to some chemists, a suboxide, Pd_2O. On exposure to sufficient heat these compounds give off their oxygen and yield the metal. The salts of the protoxide are of a brown or red colour.

Palladius, RUTILIUS TAURUS ÆMILIANUS, a Roman author of the 4th century A.D., who wrote a work, *De Re Rustica* (On Agriculture), in fourteen books, the last of which is a poem of eighty-five elegiac couplets.

Palladius, ST. See SCOTLAND (CHURCH OF).

Pallas. See ATHENA, MINERVA.

Pallas, PETER SIMON, traveller and naturalist, was born 22d September 1741, at Berlin, studied medicine and natural history at Berlin, Göttingen, and Leyden, and, already famous, was in 1768 invited to St Petersburg by the Empress Catharine. Appointed naturalist to a scientific expedition to observe the transit of Venus, he spent six years (1768–74) exploring the Urals, the Kirghiz Steppes, part of the Altai range, great part of Siberia, and the steppes of the Volga, returning with an extraordinary treasure of specimens in natural history. He wrote a series of works on the geography, ethnography, flora and fauna of the regions visited. He settled in the Crimea in 1796, and there he died, 8th September 1811.—The Sand-grouse (q.v.) is often called Pallas's Sand-grouse.

Pallavicino, SFORZA, an Italian historian, was born at Rome, 20th November 1607. Having taken priest's orders in 1630, he became in 1638 a member of the Jesuit Society, and was created a cardinal in 1659 by Pope Alexander VII. He died at Rome, 5th June 1667. The best known of his writings is *Istoria del Concilio di Trento* (Rome, 1656–57), intended as a reply to the equally celebrated and liberal work of Paul Sarpi, whose narrative is not altogether acceptable to Catholics.—FERRANTE PALLAVICINO (1618–44) wrote pasquinades which bitterly offended the papal curia and the Barberini family; and being betrayed into his enemies' hands near Avignon, he was tried, condemned by a foregone conclusion, and beheaded.

Pallice, LA, a new harbour opened (1889) to receive large transatlantic and other ocean-going vessels bound for La Rochelle in France, whence it is less than 3 miles distant. It consists of an inner basin 28½ acres in extent and an outer harbour protected by two moles, each 1380 feet long.

Palliser, SIR WILLIAM, C.B., was born at Dublin on 18th June 1830, and entered the army as a cavalry officer. In 1863 he invented the chilled shot (see SHELL) that bears his name, and a system of strengthening cast-iron ordnance by the insertion of a steel tube. He retired in 1871, sat for Taunton as M.P., and died 4th February 1882.

Pallium, the name given in the Roman Catholic Church to one of the ecclesiastical ornaments worn by the pope, by patriarchs, and by archbishops. It is worn by the pope at all times, as a symbol of his reputed universal and abiding jurisdiction. By archbishops it cannot be worn until it has been solemnly asked for and granted by the pope, and even then only during the solemn service of the great church festivals, and on occasions of the ordination of bishops or of priests, and other similar acts of his episcopal office. The pallium is a narrow annular band of white woollen web, about 3 inches wide, upon which black crosses are embroidered, which encircles the neck of the archbishop, and from which two narrow bands of the same material depend, one falling over the breast, the other over the back of the wearer. It is made wholly or in part from the wool of two lambs, which are blessed annually on the festival of St Agnes.

Palm (*Palmæ* or *Palmaceæ*), a natural order of endogenous plants, the products of which are of extreme importance and utility to man. They are arborescent, with erect stems, usually slender as compared with the extreme height to which some of the species attain, and simple or rarely branching; some are stemless, their leaves springing direct from the ground; others are sarmentose, twining about the stems and branches of neighbouring trees, by means of hooks or prickles, or trailing on the ground with stems of almost incredible length and extreme slenderness, as in the case of many of the Calami. Externally the stems are hard and horny, often coated with a siliceous deposit hard as flint, and finely polished; they frequently are armed with spines, and marked with the scars of dead leaves, or clothed in the upper part with the remains of the dead leaf-stalks enveloped in masses of fibre. The interior of the stem is generally soft and pithy, intermingled with bundles of fibre longitudinally. So soft and easily extracted is the internal substance of the stems of many palms that the outer hard case may readily be formed into a cylindrical tube. The leaves vary much in form superficially, but all the variations belong to two types—the fan-veined and the pinnate-veined. In the former the general outline is that of a fan, with veins arising from the top of the leaf-stalk and radiating like the ribs of a fan. In the other type the leaves are more or less elongated, with a distinct midrib extending to within a little of the extremity of the blade, which is always there cleft in two down to the point of the midrib, and with the veins springing from the sides of the midrib like the pinnules of a feather. Leaves of this type are sometimes entire, but more generally pinnate, and impart much elegance and grace to the figure of the particular species to which they belong. The size of palm-leaves varies extremely, some being only a few inches in length, as in some species of Malortia, while in *Manicaria saccifera* they attain the enormous proportions of 35 feet in length by 5 or 6 feet in breadth. The inflorescence is a simple or many-branched spadix enclosed in a spathe of one or several valves. The flowers are small individually, but numerous, usually of a yellow tint, and in some species powerfully odorous. They are unisexual, bisexual, or polygamous, the male and female flowers being borne in some species on different plants. The fruit when ripe is berry-like, drupaceous, plum-like, or, as in the cocoa-nut, nut-like.

Palms are natives chiefly of the tropical regions of the earth. A few are found in extra-tropical countries extending to 36° N. lat. in America, 34° N. lat. in Asia, and in Europe *Chamærops humilis*, which is the only indigenous species, extends to 44° N. lat.; no species are found beyond 38° S. lat. Linnæus, whose knowledge of palms was limited to the more arborescent species, very appropriately named them the 'Princes of the Vegetable Kingdom.' Their stately habit, the elegant proportions of the stems, and the grace and beauty of the leaves of the majority of the larger species, coupled with the great variety and utility of the products of all, mark them as a most distinguished and valuable group of plants, gratifying the eye by their adornment of the landscape, and ministering abundantly to the necessities and the pleasures of both savage and civilised man. Their stems when young and tender are delicious and nutritious food; when old and mature those of certain species yield valuable farinaceous substances; some are valuable as timber-trees, and the terminal bud of several consists of a mass of tender mucilaginous leaves, which are esteemed a delicate

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and delicious vegetable. Many yield by incision or otherwise an abundance of sweet sap, from which sugar, refreshing drinks, wines, spirits, and vinegar are obtained. Their leaves are used for thatch, and for the making of mats, baskets, hats, umbrellas, thread, cord, and clothing. They yield excellent and inexhaustible materials, and they are in some cases a natural substitute for writing-paper, the records and writings of many eastern peoples being inscribed upon them.

The order comprises, according to Hooker and Bentham in *Genera Plantarum*, between 130 and 140 genera, and the number of species known is variously estimated by different authorities at from 600 to 1000.

The genus Chamædorea is composed of about sixty species, all of slender, graceful habit, their smooth stems often not exceeding an inch in diameter, though they may be twenty or more feet high. They are used in South America for making bridges, as the bamboo is in China and India. The flowers of several of the species—including those of *C. aurantiaca* (fig. 1)—are highly esteemed as a culinary vegetable in some of the countries of Central America, but for this purpose they must be extracted from the spathe before it bursts. The fruit of *Leopoldina major*, called by the natives of Brazil *Jará-assu*, is collected by them and burned, and the ash, after being washed, is used as a substitute for salt. It is described, however, as being bitter rather than saline. *Euterpe edulis*—also a native of Brazil—produces fruit in size, shape, and colour like that of the sloe. From the fruit of this species a beverage is made by infusion which is much relished. *E. oleracea* produces an edible and nutritious cabbage. The *Nibong* of the Malays of the Eastern Archipelago is *Oncosperma filamentosa*, the cabbage of which is more highly esteemed than that of any other palm indigenous to that region. From the fruit of *Œnocarpus bataua* a wholesome beverage called *Pataua-yukissé* is made on the Rio Negro. The fruit of *Oreodoxa regia*, an extremely handsome palm, a native of Cuba, is too acrid for human food, but is used there for fattening hogs.

Fig. 1.—Chamædorea aurantiaca.

Areca catechu is the Betel-nut Palm (see ARECA). The fruit enters into the masticatory of that name so much used in India. It contains gallic acid, much tannin, a principle analogous to catechu gum, a volatile oil, a red insoluble matter, a fatty substance, and some salts. A spurious kind of catechu is obtained from the nuts in two colours—one dark or black, which is extremely astringent; the other yellowish brown, which is less astringent and more pure. Besides being used as a masticatory and in medicine in cases of dysentery, the substance is employed in tanning leather and in dyeing calico. The terminal shoot of this palm furnishes an excellent cabbage, as also do several other species of Areca. But the true Cabbage Palm is *A. oleracea*, a noble species indigenous to the West Indies, attaining the height of 170 to 200 feet, with a diameter of stem of about 7 feet. The leaves are pinnate, about 20 feet long, the pinnules in full-sized leaves being often 3 feet in length. The terminal bud or *cabbage* is enclosed among many thin snow-white brittle flakes. It has the flavour of the almond, but with greater sweetness, and is boiled and eaten with meat. As its removal causes the death of the tree, it is regarded as an extravagant delicacy only rarely to be enjoyed, because of the great importance of the other products which the tree yields. The inflorescence is extracted from the spathes before they open, are pickled, and esteemed a delicate relish with meat. The nuts yield a useful oil by decoction. The shell or outer hard crust of the stem is employed in making gutters, and the pith yields a kind of sago if extracted immediately the tree is felled; but if allowed to lie and decay on the ground, it becomes the breeding ground of a peculiar grub, which is greatly esteemed as a delicate article of food in Martinique and St Domingo.

Ceroxylon (*Iriartia*) *andicola*, a native of Peru, growing at an elevation of 8000–10,000 feet above sea-level, is a handsome species rising to the height of 160 or more feet. The stem exudes from the annular cicatrices of the fallen leaves a resinous substance called by the inhabitants *cera de palma*. It is composed of about two parts of a yellow resin and one part of wax, the texture of which is more brittle than beeswax. A sub-resinous matter is also extracted from it named *ceroxylin*, which assumes the form of silky crystals, is soluble in alcohol, and phosphorescent by friction. The exudation, mixed with certain proportions of wax or tallow, is employed in candle-making. Besides the resinous exudation the trunk yields a valuable and durable timber, the leaves are excellent and durable material for thatch, and they supply a strong, useful fibre for the manufacture of ropes and cordage. The Kiziuba Palm (*C. exorrhiza*) is a native of Central and South America, and is a singular and

Fig. 2.—Arenga saccharifera.

interesting tree on account of its peculiar habit of growth. The roots all spring from the stem above ground, every new root emerging from a point somewhat higher on the stem than the one which preceded it. And as the old roots decay as the new are produced and penetrate the ground, a tree of some age presents the curious spectacle of being supported on three or four legs long enough and wide enough apart to enable a man to pass between them erect. The timber is used in flooring and for making umbrella-sticks, musical instruments, &c. Blowpipes (q.v.) for poisoned arrows are made from the stems of *C. setigera*.

The Sugar Palm (*Arenga saccharifera*, see fig. 2) is a native of the Moluccas, Cochin-China, and the Indian Archipelago, and is of immense value to the

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natives of these countries on account of its various products. It yields an abundant sweet sap, from which a chocolate-coloured sugar named *jaggery* is made. The sap fermented makes an intoxicating drink variously named by the inhabitants of the different countries *neroo* or *brum*. From the pith of the stem sago is obtained in great quantity, a single stem yielding as much as from 150 to 200 lb. The leaves supply *Gomuto fibre*, which is celebrated for its great strength and durability when formed into cordage and ropes, and at the base of the leaves a fine woolly material, named *baru*, is developed in mature trees, which is employed in caulking ships, stuffing cushions, and making tinder.

Caryota urens (see fig. 3), one of the noblest palms of India, yields some remarkable products. The flesh of the fruit, which resembles a plum in size and structure, is very acrid, and corrodes and burns the lips and mouth. From the terminal bud a sweet watery liquor is obtained, which, when boiled, yields *jaggery*. The terminal bud is also

Fig. 3.—Caryota urens.

eaten as a cabbage. From the pith of the stem sago is obtained, which is made into bread, and prepared in various other ways, and is a valuable article of food to the natives. The tree is named *Evim-pannah* in Malabar and *Kittul* in Singhalese, and the fibre called *Kittul* is obtained from its leaves.

The genus Calamus and its immediate allies are regarded as forming a connecting link between the palms and the grasses, having the inflorescence and fruit of the former and in some cases the habit of the latter. Certain species—viz. *C. Roxburghii*, *C. Royleanus*, both of which are included in *C. rotang* by some authors, and *C. viminalis* and others—furnish the rattan-canes employed in making ropes and cables, chair bottoms, couches, baskets, mats, &c. The walking-sticks known as Malacca canes are made from the stems of *C. scipionum*, a species which grows not in Malacca, but in Sumatra, and the canes are chiefly exported from Siak in that island. The stems of the Great Rattan (*C. rudentium*) and others are of prodigious length, extending to hundreds of feet, clinging by hooks attached to their leaves to the trunks and boughs of neighbouring trees, or trailing on the ground. They are extremely hard externally, and usually smooth, with a dense siliceous crust on the surface. *C. draco* furnishes the finest quality of the resinous substance known as *Dragon's Blood* (q.v.), although a similar substance is obtained from various other plants. In this case it is exuded from the surface of the fruit, and is separated from it by rubbing or shaking the fruit together in a bag. An inferior quality of the same substance is also obtained from the tree by incision of the stem, and by steaming the fruit after the natural exudation has been collected. The species are very numerous, about 200 having been described, but few are more singular than *C. adspersus* (see fig. 4), which resembles a creeping or twining grass rather than a palm, the stems rarely exceeding in thickness stout wheat straw.—*Zalacca edulis* is regularly cultivated by the Burmese for the sake of its pleasantly acidulous fruit, which grows to the size of a walnut. The succulent scaly pulp which encloses the seed is the edible part.—*Raphia vinifera*, a native of Guinea, yields a rather abundant sap, from which a strongly spirituous wine is obtained. One of the most beautiful and singular of palms is *R. tædigera*, an inhabitant of the banks of the Amazon. The trunk of the tree is short, from 6 to 10 feet high, but from the summit the leaves rise almost perpendicularly to the height of 40 feet or more, arching gracefully outward towards the apex. The footstalk of these enormous leaves alone are often 12 or 15 feet long by 4 or 5 inches in diameter. The integument of these footstalks is thin, extremely hard and elastic, and light as a quill, and, being easily split into straight strips, is made into window-blinds, baskets, &c. by the Indians.

Fig. 4.—Calamus adspersus.

The true *sago* of commerce (see SAGO) is derived from various species of the genus Sagus, although other species of palms, as has already been stated, and also plants widely different botanically, such as *Cycas revoluta*, also yield a kind of sago. *S. Rumphii*, *S. lævis*, and *S. farinifera* are the species from which the largest quantity of true sago is obtained. *S. Rumphii* is a native of the Indian Archipelago, Malacca, Borneo, Sumatra, Celebes, and the Moluccas being the principal places in which it is cultivated. The tree is small, rarely exceeding 30 feet in height of stem, which consists of a hard shell about 2 inches thick enclosing a mass of spongy pith—the sago. This pith is gradually absorbed after the tree reaches maturity, leaving the stem quite hollow. The proper time to fell the trees, before the pith begins to diminish in bulk or quality by absorption, is indicated by the upper leaves becoming covered with a sort of farina or white dust. When felled the stem is cut into lengths of 6 or 7 feet, which are split, the better to remove the pith. There are various modes of extracting the fecula from the insoluble substances with which it is combined in the stem, but washing and straining are the principal features of every process. A single tree, it is said, will yield from 500 to 600 lb. of sago.—The Buche (*Mauritia flexuosa*), a native of Guiana, supplies the chief wants of the people wherever it grows; the stems furnish timber for building their dwellings, the leaves thatch for the same, and material for mats, couches, hammocks, &c.; the pith yields sago; the juice by fermentation gives an excellent beverage; the kernels of the

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fruit are ground into meal and made into bread; and the fibre is converted into cordage and clothing.—The Palmyra Palm (*Borassus flabelliformis*) is one of the most common of its tribe in India. In some parts of the country it grows spontaneously, and it is found as far north as 30°; in others it is the subject of careful cultivation. It furnishes the greater part of the palm-wine of India, which by the natives and Famuls is called *Callu* and *Noongpoo*, and by Europeans *Toddy*. The fruit is about the size of a child's head, somewhat triangular, and within a thick, fibrous rind contains three seeds about the size of a goose's egg. The seeds when young are eaten by the natives, being jelly-like and palatable. The toddy is obtained by wounding the spathe before the inflorescence expands. After a few days a clear, sweet liquor exudes from the wound, and is carefully collected in pots suspended under the wounded spathe. A tree yields about three quarts daily. The liquor is drunk fresh, and will only keep sweet for about three days, when it undergoes fermentation and becomes sour, and is distilled into *arrack*. *Jaggery* is also made from the juice. The young plants when a few inches high are cooked and eaten as a vegetable. The leaves, which are fan-shaped and large, are turned to the various uses alluded to in connection with species already described, and in India they are almost universally used for writing upon with an iron stylus.

The Double Cocoa-nut, or Sea Cocoa-nut as it has been called, is *Lodoicea seychellarum*. The nuts of this tree are seen occasionally in museums and in the cabinets of collectors of *curios*, often beautifully polished and carved by native workmen, and formed into caskets and other ornaments. For long their origin was shrouded in mystery. They were frequently found floating about in the ocean before the discovery of the tree, and an absurd belief was entertained by Malay and Chinese sailors that they were the fruit of some marine tree. The tree, a native of the Seychelle Islands, is very elegant, attaining a height of from 50 to 80 feet, with leaves 20 feet long supported on stalks of equal length. The fruit is one of the largest produced by any of the palms, being a foot or a foot and half in length. The kernel near the base is divided into two parts—hence the name Double Cocoa-nut—and while young part of the fleshy substance in which it is enclosed is edible. The chief products of the tree are timber and fibre for cordage, and a downy kind of fibre which envelops the young leaves is used for filling mattresses and pillows.

The Talipat Palm of Ceylon (*Corypha umbraculifera*) is notable only for the variety of uses to which its leaves are put in Ceylon and other parts of India to which it is indigenous. The leaves are of immense size, and, being palmate with the leaf-stalk attached near the middle, they are readily formed into umbrellas and tents; the cane-like ribs being removed and the blades neatly stitched together, they may be folded up with great facility. They are also very much used for the books or *colahs* of the inhabitants. Many of these alleged to be made of Egyptian papyrus are formed of the leaves of this palm. The tree grows to the height of 100 feet, and has a very grand and imposing appearance.—A closely allied species (*C. taliera*) is the Talipat Palm of the Indian peninsula. It grows to about the same height as the preceding species, with leaves of a more durable kind for the purposes of thatch, but not so adaptable to more delicate and artistic uses.—*Licuala peltata* is the Chittah-pat of Assam, the leaves of which are extensively used for making umbrellas, punkahs, and hats. The stems of *L. acutifolia* are made into walking-sticks, named by Europeans *Penang Lawyers*.—*Copernicia cerifera*, a native of northern Brazil, produces an edible fruit; and from the leaves, after they have been removed from the trees and dried, is obtained an inferior kind of vegetable wax, which is used in candle-making and to adulterate beeswax.

Of the American Palmetto Palm, a native of the Carolinas and Florida, the most important species is the Cabbage Palmetto (*Sabal palmetto*), which sometimes grows to 50 feet in height and 15 inches in diameter, with leaves 5 feet long and broad. It is found also in the Bermudas. Its products are timber and the leaves, the former being exceedingly durable, very porous (see MOULTRIE), and especially valuable for wharf-building, as it resists water and is not attacked by the teredo. The fruit is not edible.—The Palmetto of Europe is *Chamærops humilis*, which inhabits the countries on both shores of the Mediterranean, occupying great tracts. It rarely reaches 10 feet in height, and usually is much less, its growth being exceedingly slow. The leaves are fan-shaped and abound in excellent fibre, with which the Arabs, combining it with camels' hair, make tent-covers; in Spain it is made into ropes and sailcloth, and in France into carpets, named *African haircloth*. The French in Algeria make paper and pasteboard of it, and so well adapted is it to this purpose that its use might be more extended in other countries. The fruit is edible, and is eaten by the Arabs and the inhabitants of Sicily and Southern Italy. The plant endures the climate of London, but scarcely grows. *C. Ritchieana*, a native of Sind and Afghanistan, and *C. excelsa*, a native of China and Japan, both produce excellent fibre. The leaves of *Thrinax argentea* supply the material called *chip*, of which ladies' hats and bonnets of that name are made. The trunks of *T. parviflora*, a native of Jamaica, though of slender diameter, are said to be very suitable for

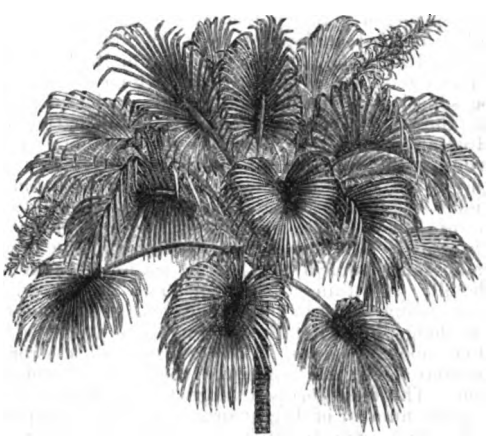

Fig. 5.—Sabal (Trithrinax) mauritiæformis.

piles and marine buildings subject to immersion, as they are impervious to the influence of water, and are not attacked by borers or worms. *Sabal* (*Trithrinax*) *mauritiæformis*, a native of New Granada (fig. 5), is a low-growing but very handsome palm, not remarkable for any products of special utility.

The *Piritu* of Venezuela, the *Paripou* of Guiana, and the *Paxiúba* of the Amazon are the local names of one species of palm—*Gulielma speciosa*. It produces fruits somewhat triangular in shape, about the size of an apricot, and bright reddish yellow in colour. They have a peculiar oily flavour, and are eaten boiled or roasted, when they resemble chestnuts. They are also ground into meal, which

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is baked in cakes.—The Great Macaw tree of the West Indies (*Acrocomia sclerocarpa*) is a native of Jamaica, Trinidad, and the adjacent islands and continent. In Brazil it is called *Macahuba*, and in Guiana *Macoya*. The tree grows from 20 to 30 feet high, with a crown of leaves, each of which measures from 10 to 15 feet in length. The fruit yields an oil of yellow colour, sweetish taste, and having the odour of violets, which is employed by the natives as an emollient for painful affections of the joints; and in Europe it is used in the manufacture of toilet soaps. The nuts are capable of receiving a high polish, and are converted by the natives and the negroes into ornaments.—The Tucum Palm (*Astrocaryum tucuma*), a native of the Rio Negro and the Upper Amazon, yields a very superior fibre, the cordage from which is knitted into hammocks, which are in great demand with the Brazilians. The fleshy outer covering of the fruit is eaten by the natives.—The Murumuru Palm (*A. murumuru*) produces a very agreeable fruit with the fragrance of musk. Cattle eat the fruit with avidity, but evacuate the hard stony seeds undigested. In times of scarcity these seeds are carefully collected and used to feed pigs, which are very fond of them, and find no difficulty with their powerful teeth and jaws in masticating them. —*Attalea funifera* furnishes the whalebone-like fibre now so much used in Britain for making brooms and brushes. The tree attains the height of 20 or 30 feet. At the base of the leaves, which are used for thatching, the fibre known in commerce as *Piassava fibre*, *Para Grass*, and *Monkey Grass* is produced. It is employed in the countries in which it grows to make coarse but strong and durable cables, but is unfit for any finer purpose. The fruit is the well-known *Coquilla nut*, much used in turnery for the making of knobs to walking-sticks and umbrellas, handles to bell-pulls, &c. The nuts are extremely hard and susceptible of a fine polish, and exhibit a beautifully mottled surface of light and dark brown. —The fruit of *A. cohune* yields from its kernel a valuable oil called *Cohune Oil*, which is said to be superior in quality and to burn twice as long as the best cocoa-nut oil. It is a native of Honduras and the Isthmus of Panama. The trunk, which attains the height of about 40 feet and is crowned with leaves some 30 feet long, yields by tapping a kind of palm-wine.—The *Palm-oil* of Africa is the product of the fruit of *Elæis guineensis*. The tree is cultivated now in the West Indies and tropical South America for the sake of the oil. It attains a height of 60 to 80 feet, with a spreading crown of pinnate leaves, each about 15 feet long, the footstalks of which are armed with stout hooked spines. The flowers have a strong peculiar smell, like anise and chervil in combination. The fruit forms a large head, consisting of a great number of bright orange-coloured drupes; when ripe each drupe has an oily pulp with a stone or kernel in the centre, and it is from this pulp that the oil is obtained. To extract the oil the pulp is first bruised to a paste in wooden mortars, and is then boiled in water. The oil which rises to the surface of the water is reddish or orange in colour, and has an agreeable odour of violets; it is allowed to cool, and is then skimmed off. In warm countries it retains its oily consistence, but in cooler climates it acquires the solidity of butter. It is used by the natives universally as butter is in Europe. The quantity of palm-oil now imported to Great Britain is enormous. It is employed in the manufacture of candles, toilet and common soaps, and as a lubricant of railway-carriage wheels, &c. It is composed of about thirty-one parts of stearin and sixty-nine of olein. The tree yields from its trunk abundance of palm-wine.—The *Coquito* of Chili is *Jubæa spectabilis*, a tree of about 50 feet in height, with a spreading crown of leaves. From its trunk a syrup is extracted, called *miel de palma*, which is much esteemed by the Chilians and Europeans in cookery in various ways. It is obtained by cutting down the tree and lopping off its crown of leaves, when the sap flows from the wound, and is carefully collected. By cutting off a fresh slice from the wound daily, or when the flow of sap becomes weak, it may be kept flowing for several months; a good tree is said to yield as much as ninety gallons of sap, which on being boiled down assumes the consistence of treacle.

Much information on palms and their products will be found in the *Historiæ Palmarum*, by Martius; in the *Flora Braziliensis*, by Drude; and *A Popular History of Palms*, by Seeman. See ARECA, COCOA-NUT, CHAMÆROPS, DATE PALM, DOOM PALM, FIBROUS SUBSTANCES, &c.

Palm, a measure of length, originally taken from the width of the hand, measured across the joints of the four fingers. In Britain a palm is, somewhat loosely, understood to be the fourth part of an English foot, or 3 inches.

Palm, JOHANN PHILIPP, a bookseller of Nuremberg, who has acquired historic celebrity as a victim of Napoleonic tyranny in Germany, was born at Schorndorf in 1768. In the spring of 1806 a pamphlet entitled *Deutschland in seiner tiefsten Erniedrigung* (Germany in its Deepest Humiliation), which contained some bitter truths concerning Napoleon and the conduct of the French troops in Bavaria, was sent by his firm to a bookseller in Augsburg in the ordinary course of trade. The book fell into the hands of Napoleon's officers; they made the emperor acquainted with it. He ordered Palm, as the publisher, to be arrested, tried him by court-martial, and shot him at Braunau, 26th August 1806. This murder greatly incensed the German people against the French.

Palma, (1) the capital of the island of Majorca (q.v.) and of the Balearic Islands, stands on the Bay of Palma, on the south coast. The cathedral, a Gothic edifice (1232–1601), contains the tomb of King Jayme II. of Aragon and a valuable collection of church ornaments. The tomb of Raymond Lully (q.v.) is in the church of St Francis. There are, further, a beautiful exchange (1426–46), an old Moorish palace, and a 16th-century town-hall, with pictures. Palma is one of the most aristocratic cities in Europe. Pop. (1887) 60,514. They weave silks and woollens, make jewellery, and various articles of common use. The port is protected by a mole, and the town by a wall and batteries. The commerce reaches a total value of about £1,600,000 per annum.—(2) A town of Sicily, 14 miles SE. of Girgenti. Pop. 11,702.—(3) The name of one of the larger of the Canary Islands (q.v.).

Palma, JACOPO, commonly called PALMA VECCHIO (i.e. Old Palma), painter of the Venetian school, was born about 1480 at Serinalta, near Bergamo, and died at Venice just about the middle of the year 1528. At first working under the influence of the Bellinis, he subsequently painted in the spirit and style of Giorgione and Titian, and may be placed at the head of the second class of great Venetian artists. His pictures are either sacred subjects or portrait groups. Of the former the best are a series of six figures of saints, St Barbara and others, in the church of St Maria Formosa at Venice. The best portrait group is three sisters, generally called the 'Three Graces.'—His brother's grandson, likewise called JACOPO (1544–1628), and nicknamed IL GIOVANE (the Younger), painted religious pictures of greatly

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inferior merit, though he modelled his style on that of Titian, Palma Vecchio, and Tintoretto. Except for eight years in Rome, he spent all his life at Venice.

Palma Christi. See CASTOR-OIL PLANT.

Palmblad, VILHELM FREDRIK, a Swedish historian, was born 16th December 1788, at Liljested, in East Gothland, where his father held a post under the government, studied at Upsala, and became professor of Greek in the same university in 1835. He died 2d September 1852. Amongst his works (which deal with geography, history, and classical philology) are the *Biografisk Lexikon* (23 vols. 1835–59) and the historical novel *Aurora Koningsmark* (1847).

Palmellaceæ. See ALGÆ.

Palmer (Lat. *palmifer*, 'a palm-bearer'), properly so called, was a pilgrim who *had performed* the pilgrimage to the Holy Sepulchre, and had returned, or was returning home after the fulfilment of his vow. The Palmers were so called from their carrying branches of the oriental palm, in token of their accomplished expedition. On arriving at their home they repaired to the church to return thanks to God, and offered the palm to the priest, to be placed upon the altar.

Palmer, EDWARD HENRY, the 'Sheikh Abdullah,' was born 7th August 1840, at Cambridge, and while a schoolboy there picked up Romany (the Gypsies' tongue), while a clerk in the City Italian and French. In 1859 he all but died of consumption; in 1860 at Cambridge began to devote himself to oriental studies—Arabic, Persian, and Hindústáni; in 1863 obtained a sizarship at St John's; and in 1867, graduating with a third-class in classics, was yet elected a Fellow of his college. During 1868–70 he was engaged for the Palestine Exploration Fund in the survey of Sinai, and, with Charles Tyrwhitt Drake, of the Desert of the Wanderings, acquiring meanwhile a marvellous knowledge of the wild Arab tribes. In 1871 he was appointed Lord Almoner's professor of Arabic at Cambridge (his stipend £40, 10s., augmented next year by £250); and in 1874 he was also called to the bar. So ten years went by of work and play—he was a wonderful conjurer—of sorrow, too, and trouble, for he lost his first wife and got involved in money difficulties, till in 1881 he turned London journalist, writing principally for the *Standard*. Finally, in June 1882, on the eve of Arabi's Egyptian rebellion, he was pitched on by government for the perilous mission of winning over the Sinai tribes to Britain and hindering the destruction of the Suez Canal. He made two expeditions—the first his great ride from Gaza to Suez (July 15–31), and the second when, starting from Suez with Captain Gill, R.E., and Lieutenant Charrington, R.N., he and they on August 11 were betrayed and murdered in the ravine of Wady Sudr. Eight months later the three were buried in St Paul's.

Of a score of works by Professor Palmer may be mentioned his *Desert of the Exodus* (1871), *Arabic Grammar* (1874), *Song of the Reed* (1876), *Poems of Behâ ed Din Zoheir* (1876–77), *Persian-English and English-Persian Dictionary* (1876–83), *Haroun Alraschid* (1880), and a translation of the *Koran* (1880). See his Life by W. Besant (1883).

Palmer, ROUNDELL. See SELBORNE (LORD).

Palmer, SAMUEL. See ENGRAVING, Vol. IV. p. 380.

Palmerston, HENRY JOHN TEMPLE, VISCOUNT, was born at the family mansion, Broadlands, near Romsey, Hants, 20th October 1784, and belonged to the Irish branch of the ancient English family of Temple, taking name from Temple in Leicestershire. Sir W. Temple, the diplomatist and patron of Swift, was a member of this family, which removed to Ireland about 1601, and which was ennobled in 1722, when Henry Temple was created a peer of Ireland with the dignities of Baron Temple and Viscount Palmerston. His grandson, Henry, second Viscount (1739–1802), was father of the great minister, and superintended his education at Broadlands, until he sent him to Harrow. Young Temple in 1800 went to the university of Edinburgh, where he attended the lectures of Dugald Stewart and other professors. In 1802 he succeeded his father as third Viscount, and in 1803 he matriculated at St John's College, Cambridge. His eminent abilities were early recognised, for he was scarcely of age when the Tory party in the university selected him (1806) as their candidate to succeed Mr Pitt in the representation. Unsuccessful at Cambridge then and again in 1807, he entered parliament in the latter year for Newport, in the Isle of Wight, his colleague being Arthur Wellesley, then Chief-secretary for Ireland. In 1811 he exchanged Newport for the university of Cambridge, enjoyed the distinction of representing his *alma mater* for twenty years, and only lost his seat when he became a member of the Grey administration and supported the Reform Bill. For the last two years of the unreformed parliament he sat for the now extinct borough of Bletchingly. At the first election after the Reform Act he was returned for South Hampshire, but lost his seat at the general election of 1835. He immediately afterwards found a seat for the borough of Tiverton.

Having traced his representative, we now turn to his official career. Palmerston entered life as a member of the Tory party, and accepted the office of Junior Lord of the Admiralty and Secretary at War (without a seat in the cabinet) in 1809. This office he held during the successive governments of Mr Perceval, the Earl of Liverpool, Mr Canning, Lord Goderich, and the Duke of Wellington—a period extending from 1809 to 1828. There was ample scope at the War Office for Palmerston's administrative talents and activity. The military system swarmed with abuses, and the labour thrown upon the Secretary at War during the Peninsular campaigns was prodigious. In 1816 an attempt was made to assassinate Palmerston by an insane army-lieutenant, named Davis, who fired a pistol at him as he was entering the Horse Guards; the bullet, however, only inflicted a slight wound. Palmerston early attached himself to the Canning section of the Liverpool administration, and he accepted a seat in the cabinet of Mr Canning. His official connection with the Tory party ceased in 1828, when the 'Great Duke' insisted on accepting Mr Huskisson's resignation, which was followed by Palmerston's retirement. The Duke's government was swept away in the reform flood of 1830; and Earl Grey, who became prime-minister, offered the seals of the Foreign Office to Palmerston. The European horizon was so disturbed at this crisis that a great political authority declared that if an angel from heaven were in the Foreign Office he could not preserve peace for three months. Palmerston falsified the prediction. Louis-Philippe then filled the throne of France; and for the first time on record England and France acted in concert, and without jealousy, under Palmerston's foreign ministry. He took a leading part in securing the independence of Belgium, in establishing the thrones of Queen Isabella of Spain and Queen Maria of Portugal on a constitutional basis, in endeavouring, in alliance with Austria and Turkey, to check Russian influence in the East, and in the war with Mehemet Ali. In 1841 Palmerston went out of office with the Whigs on the question of free trade in corn; but on their return in 1846

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he resumed the seals of the Foreign Office. His second foreign administration furnished various subjects of hostile party criticism, among which may be mentioned the civil war in Switzerland, the Spanish marriages (see GUIZOT), the European revolutions in 1848, the rupture of diplomatic relations between Spain and Great Britain, and finally, the affair of Don Pacifico (a Gibraltar Jew living in Athens, who claimed the privileges of a British subject), and the consequent quarrel with Greece. His strenuous self-asserting character, his brusque speech, his frequently hasty interferences in foreign affairs, were little calculated to conciliate opponents at home, and secured him many enemies abroad—the name 'Firebrand Palmerston' still clinging to him on the Continent. A vote of censure on the foreign policy of the government was in 1850 carried in the House of Lords on the motion of Lord Stanley (afterwards Earl of Derby). A counter-resolution, approving the foreign policy of the government, was thereupon moved by Mr Roebuck in the Lower House. The debate lasted four nights. In a speech of five hours' duration—'that speech,' said Sir Robert Peel, 'which made us all so proud of him'—Palmerston entered upon a manly and dignified vindication of his foreign policy; and Mr Roebuck's motion was carried by a majority of forty-six.

In December 1851 the public were startled at the news that Palmerston was no longer a member of the Russell cabinet. He had expressed to the French ambassador in London his approbation of the *coup d'état* of Louis Napoleon, without consulting either the premier or the Queen; and, as explanations were refused, Lord John Russell advised his resignation. Palmerston, in the general opinion, was 'smashed;' but he soon got his 'tit for tat;' for in the following February, soon after the meeting of parliament, he avenged himself by shattering the Russell administration to pieces on a comparatively trifling question—a Militia Bill. He refused an offer from the Earl of Derby to join the government which he was commissioned to form, but accepted the post of Home Secretary in the coalition administration of the Earl of Aberdeen in 1852. The fall of this coalition government in the winter of 1854–55, on Mr Roebuck's motion for a Sebastopol committee, placed Palmerston in his seventy-first year in the position of prime-minister, to which he was unanimously called by the voice of the nation; in his own phrase he was 'the inevitable.' He vigorously prosecuted the Russian war until Sebastopol was taken, and peace was made. His government was defeated in March 1857 on Mr Cobden's motion condemnatory of the Chinese war. Palmerston appealed to the country, and met the House of Commons with a largely increased majority. But his administration fell in February 1858, over the Conspiracy Bill, intended to protect the French emperor against the machinations of plotting refugees. A short Conservative administration followed; but in June 1859 Palmerston was again called to the post of First Lord of the Treasury, which he continued to fill up to his death, the chief events of this premiership being the American civil war (with its *Trent* and *Alabama* incidents), Napoleon's war with Austria, and the Austro-Prussian war with Denmark. His last great speech was his defence of the policy of his government, delivered in July 1864, in reply to the attack of Mr Disraeli. He died at his country seat, Brockett Hall, 18th October 1865, and was buried in Westminster Abbey. Both his titles became extinct with him.

It was his ambition to be considered the minister of a nation rather than the minister of a political party; and his opponents have been constrained to admit that he held office with more general acceptance than any English minister since the time of the great Lord Chatham. As an orator he was usually homely and unpretending, but always sensible and practical. He was a dexterous tactician, of irrepressible spirit, and a ready, witty, and often brilliant debater. He was popular as a minister, because he was thoroughly English in his ends and aims. Even his robust health, off-hand manner, manly and usual jaunty bearing, and physical vigour were elements of his popularity, because they were regarded as a glorification of the English sports, which he was never ashamed to patronise. He desired nothing so ardently as to promote the prosperity, influence, and grandeur of Great Britain, and his national character and national spirit were thoroughly appreciated by his countrymen.

See *Life of Palmerston*, by Lord Dalling (3 vols. 1870), continued by Evelyn Ashley (2 vols. 1879); and smaller works by Anthony Trollope (1882), Lloyd Sanders (1888), and the Marquis of Lorne (1892).

Palmerston. See PORT DARWIN.

Palmer-worm, a name given to many large kinds of grub, the larvæ of coleopterous insects, destructive to various vegetable substances.

Palmetto-leaves, the leaves of the Palmyra palm (see PALM, p. 723), imported into Europe for the manufacture of hats and mats. For the palm known as Palmetto, see PALM, p. 720.

Palmieri, LUIGI, meteorologist, born 22d April 1807, taught mathematics in several lyceums, became in 1847 professor at Naples, and in 1854 director of the observatory on Vesuvius. He has invented many meteorological instruments, and written several works on volcanoes and seismology.

Palmi'pedes, also called NATATORES, or SWIMMERS, the web-footed birds, in some classifications an order of Birds (q.v.).

Palmistry, or CHIROMANCY (Gr. *cheir*, 'the hand, and *mantikē*, 'divination'), is the art of 'reading the palm'—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the *palm* of his hand, and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a 'science,' or at least as a branch of an interpretative science of the hand in general, to which the name *Chirosophy* has been given. The other branch of this general science has been called *Chirognomy*, and is concerned with the interpretation of the form and character of the hand and fingers, while Chiromancy treats of the palm only (see DIVINATION).

As an art palmistry appears to be of great antiquity. Mr Nesfield, in his Report on the caste system in the North-west Provinces and Oudh (1885), tells us that there is a caste of Brahmans, called Joshi, who profess the art of fortune-telling by means of marks on the palms of the hands, the face, and the body generally; and who seem to have practised it from remote times. Palmistry has an ancient literature of its own in India; the ancient Samudriki appears to have had some acquaintance with letters, but the Joshi, his modern representative, is quite illiterate, though he generally carries about with him a manual of palmistry, of whose contents he knows nothing. There are also a number of wandering outcasts in India who tell fortunes by palmistry.

That palmistry was to some extent at least known to the ancient Greeks we have evidence in the writings of the Stagirite himself. In his

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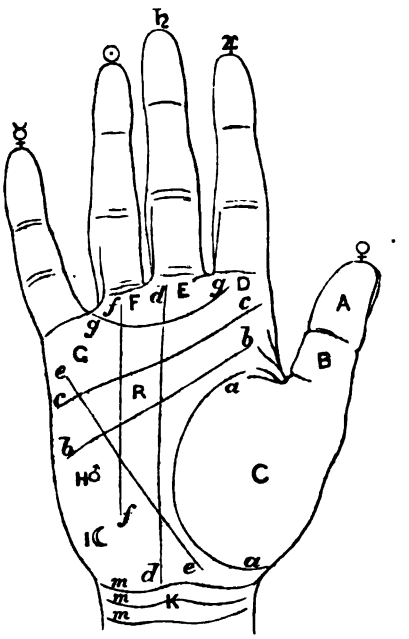
Hist. Animalium Aristotle observes (i. 15) that long-lived persons have one or two lines which extend through the whole hand; short-lived persons have two lines not extending through the whole hand. Other references to this subject occur in the doubtful works, the *Problemata* and the *Physiognomika*, attributed to him. Pliny, too, in his Natural History (xi. 114) directly asserts that Aristotle regarded numerous broken lines in the palm of the hand as a prognostic of short life.

Of the cultivation of palmistry among the Romans there is little evidence; but Juvenal, in showing up the curiosity of women and their love of prying into forbidden mysteries, describes the woman of fashion as consulting eagerly Chaldean astrologers and other diviners, while the middle-class woman 'frontemque manumque præbebit vati' (*Sat.* vi. 581). In the 2d century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

In writers of the middle ages there is much reference to the subject, and the names of Paracelsus, Albertus Magnus, and Cardanus have been associated with it. But the most important work on chiromancy belonging to this period seems to be *Die Kunst Ciromantia*, of Johann Hartlieb, which was printed at Augsburg in 1475. In the 16th century we find several treatises on the subject, of which the most important seem to be those of Johann. Indagine, and of Barthelemy Cocles 'de Bouloigne,' doctor of natural philosophy and of medicine. The former has been Englished by Fabian Wither (London, 1651). In the end of the 18th century palmistry found an important exponent in the celebrated Marie Anne Lenormand (1772–1843), who in her *Souvenirs Prophétiques d'une Sibylle* (1814) foretold the downfall of Napoleon. The chief authorities on palmistry in recent times are two Frenchmen—M. le Capitaine D'Arpentigny, and M. Adrien Desbarrolles; and it is on their works that modern English books on the subject are chiefly founded. D'Arpentigny has expounded principally chirognomy, or that branch of the interpretative science of the hand which treats of the general form of the hand and fingers. The observation of the fingers and joints of the hand is quite as important to the chiromant as that of the palm itself; but we must refer for D'Arpentigny's system to the works cited below. The thumb is generally regarded as chirognomically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power (see A and B in diagram). What has to be considered by the chiromant proper is the 'mounts' of the hand, with the marks on them, and the lines in the palm. The 'mounts' are the elevations at the base of the fingers and thumb and in the 'percussion' of the hand—i.e. the side of the palm which extends from the root of the little finger to the wrist: it is so called because it is used in striking. They are seven in number, and are named from the planets, by the signs of which they are also known—viz. ♀ for Venus, ♃ for Jupiter, ♄ for Saturn, ☉ Apollo, ☿ Mercury, ♂ Mars, ☾ the Moon (see diagram). When well developed the mounts indicate the possession of the quality associated with the respective planets—e.g. Jupiter developed denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs.

There are four principal lines—viz. the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette or the bracelets. These last (the bracelets), if well marked, strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart (the *linea mensalis* of ancient chiromancy), if long, clear cut, and well coloured, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury.



A, will; B, logic; C, mount of Venus; D, mount of Jupiter; E, mount of Saturn; F, mount of Apollo; G, mount of Mercury; H, mount of Mars; I, mount of the Moon; K, the rascette; *a*, *a*, line of life; *b*, *b*, line of head; *c*, *c*, line of heart; *d*, *d*, line of Saturn or fate; *e*, *e*, line of liver or health; *f*, *f*, line of Apollo or fortune; *g*, *g*, the girdle of Venus; R, the quadrangle; *m*, *m*, *m*, bracelets of life.

A good line of head—i.e. a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding head-line shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn or fate (*d*, *d*), the line of Apollo (*f*, *f*), the line of liver or health (*e*, *e*), and the line of Venus (*g*, *g*). A long, clear-cut line of Saturn (see diagram) foretells a happy and prosperous life, breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; while the Venus line (*Cingulum Veneris*), when present, indicates a character very liable to be influenced by the passion of love. Marks on the mounts or lines, such as stars, crosses, &c., have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

The best handbooks are S. D'Arpentigny, *La Chirognomie* (Paris, 1843); A. Desbarrolles, *Les Mystères de la Main* (1859), and his *Révélations Complètes* (1874); Beamish, *The Psychonomy of the Hand* (1865); A. R. Craig, *The Book of the Hand* (1867); H. Frith and E. Heron Allen, *Chiromancy, or the Science of Palmistry* (1883); Heron

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Allen, *Manual of Cheirosophy* (1885); L. Cotton, *Palmistry and its Practical Uses* (1890).

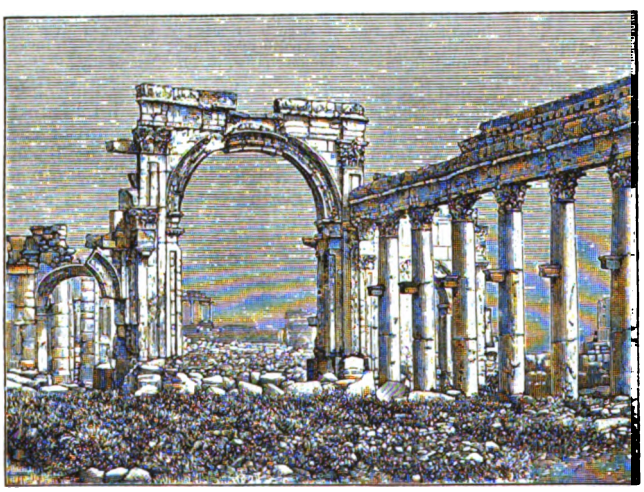
Palmitin. See FATS.

Palm-oil. See PALM, and OILS.

Palm Sunday (Lat. *Dominica Palmarum*, or *Dom. in* or *ad Palmas*), the Sunday before Easter, is so called from the custom of blessing branches of the palm-tree, or of other trees substituted in those countries in which palm cannot be procured, and of carrying the blessed branches in procession, in commemoration of the triumphal entry of our Lord into Jerusalem. The date of the origin of this custom is uncertain; the procession cannot be traced back beyond the 8th century, though the name Palm Sunday is found two or three centuries earlier. The Greeks appear to have adopted the festival long before the Latins; their procession is at matins. In the Roman Catholic Church the celebrant blesses the branches before the mass, and they are then distributed to the people; the clergy in procession pass out of the church, the doors are closed, and the ancient hymn known in English as 'All glory, laud, and honour' is sung by the choir within and those without, until, on the sub-deacon's knocking at the door, it is again thrown open, and the procession re-enters. During the singing of the Passion in the solemn mass which ensues, the congregation hold the palm-branch in their hands, and at the conclusion of the service it is carried home to their respective houses, where it is preserved during the year. Afterwards it is burned, and the ashes employed, as a rule, for Ash-Wednesday. At Rome the pope himself distributes the palm branches to all the churches of the city. In Moscow until 1700, and in parts of Germany until the beginning of the 19th century, a wooden image of an ass was led about the streets, followed by the people bearing the consecrated branches.

Palm-tree. See PALM.

Palmyra, in ancient times, from about 100 A.D. to the 14th century, more especially in the 2d and 3d centuries, a wealthy and magnificent



Portico of the Great Colonnade.

city of northern Syria, situated in an oasis on the northern edge of the Arabian desert, about 150 miles NE. of Damascus and nearly midway between that city and the Euphrates. The Semitic name was Tadmor, Palmyra (= 'city of palms') being the Greek and Latin equivalent. According to the old tradition, it was founded by Solomon. There is stronger probability that it was an Arabic settlement, planted at a spot that formed a convenient station on the great caravan route between the Persian Gulf and the Mediterranean. At all events, after the decline of Petra (q.v.; also NABATÆANS) in 105 A.D., Palmyra took its place as the chief commercial centre in northern Arabia. Its merchant aristocracy reaped great advantage from the long-protracted wars between Rome and Parthia by acknowledging the supremacy of Rome. From both Hadrian and Septimius Severus it received special favours and privileges. One of its chiefs, Odænathus, husband of the more famous Zenobia (q.v.), extended his power over most of the adjoining countries, from Egypt to Asia Minor. Aurelian at length crushed in 272 the attempt of the Palmyrenes to found an independent empire. After the Roman empire became Christian Palmyra was made a bishopric. When the Moslems conquered Syria Palmyra also submitted to them. From the 15th century it began to sink into decay, along with the rest of the Orient. Magnificent remains of the ancient city still exist, chief among them being the great temple of the Sun (or Baal); the great colonnade, nearly a mile long, and consisting originally of some 1500 Corinthian columns; and sepulchral towers, overlooking the city. The ancient Palmyrenes, besides conducting and controlling the caravan trade across the desert, extracted salt, tanned leather, and worked in gold and silver.

See Wood, Bouverie, and Dawkins, *Ruins of Palmyra* (1753); Seiff, *Reisen in der Asiatischen Türkei* (1875); and the account of Prince Abamelek-Lasareff of his explorations (in Russian, 1885).

Palmyra Wood, properly the wood of the Palmyra palm (see PALM, p 723); but the name is generally used for all kinds of palm-tree wood imported into Britain; much of which is the wood of the cocoa-nut palm, *Cocos nucifera*, and the allied species *C. plumosa*.

Palni Hills, a range of Southern India, linking the southern extremities of the Eastern and Western Ghâts; average height of the higher ridge, 7000 feet. The climate of the Palni Hills is singularly pleasant and equable, many preferring the sanatorium of Kodaikanal to Ootacamund.

Palo Alto, 30 miles from San Francisco, the seat of a university founded at a cost of upwards of $15,000,000 by Senator Leland Stanford. The institution is to provide, entirely gratis, education from the Kindergarten stage to the most advanced instruction that human teachers can supply; and all the pupils are to board on the premises, at the smallest possible charge.

Palolo (*Palolo viridis*), an edible annelid, allied to the Lug-worm, extremely abundant at certain seasons in the sea above and near the coral-reefs which surround many of the Polynesian Islands. The body is cylindrical, slightly tapering at both ends, divided into nearly equal joints, each joint with a small tuft of gills on each side. In thickness the palolo resembles a very fine straw; in length it varies from 9 to 18 inches. These annelids make their appearance in great multitudes, apparently rising out of the coral-reefs, and with a periodical regularity which is very remarkable. They are eagerly sought after by the islanders, who are on the watch for their appearance, and go out in canoes before sunrise to take them by means of nets; but they often occur in such

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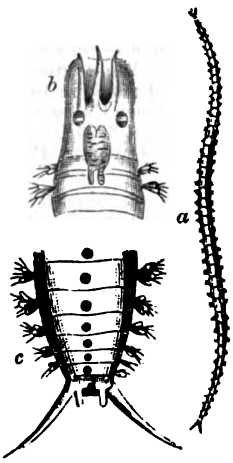
numbers that the water seems to be full of them, and they may be grasped by handfuls. After sunrise the creatures break into pieces and the shoals are not seen till the next period, which seems to have a definite relation to the lunar time; the two stated periods being in October and again in November.



a, *Palolo viridis*, half natural size; *b*, *c*, anterior and posterior extremities (mag.).

Palos, a small Spanish port at the mouth of the Rio Tinto, and 5 miles SE. of Huelva. Once an important place, from whence Columbus started on his great voyage, it has now sunk to a village of 1200 inhabitants.

Palpitation is the term used of the condition in which a person becomes painfully aware of the beating of his own heart. This occasionally happens even when the heart's action is apparently quite natural; but much more generally the pulsations are found to be greatly increased in force, and in most cases in frequency as well. It may be either functional or a symptom of organic disease of the heart. Here we shall merely consider it as a functional disorder. Although it may be persistent, it far more frequently comes on in paroxysms, which usually terminate within half an hour, recurring afterwards quite irregularly, sometimes daily or several times a day, and sometimes not till after a long interval. The attack often comes on under some mental or physical excitement, but sometimes when the patient is quite composed, or even asleep. If the paroxysm is a severe one the heart feels as if bounding upwards into the throat; and there is a sensation of oppression over the cardiac region, with hurried or difficult respiration. Excluding organic diseases, the causes of this affection are either (1) an abnormally excitable condition of the nerves of the heart, or (2) an unhealthy condition of the blood.

(1) Amongst the causes of disturbed innervation may be especially noticed the abuse of tea (especially green tea), coffee, spirits, and tobacco. Any irritation of the stomach and intestinal canal may be reflected to the heart; and hence palpitation may frequently be traced to flatulence, undue acidity, and intestinal worms, especially tapeworms. Everything that causes pressure on the heart, such as tight-lacing, abdominal dropsy, or an enlarged uterus, is also liable to occasion this affection.

(2) If the blood is abnormally rich and stimulating it may give rise to palpitation, as in Plethora (q.v.); but the opposite condition, known as Anæmia (q.v.), is a much more common cause of this affection. In anæmia the blood is watery and deficient in fibrine, and (far more) in red colouring matter; and, being thus in an unnatural state, it acts as an unnatural stimulant, and induces frequent and abnormally strong pulsations.

The age at which palpitation most usually comes on is from fifteen to twenty-five; and the affection —especially if it arise from anæmia—is very much more common in the female than in the male sex.

The treatment of palpitation must entirely depend upon its cause. The use of all nervous stimulants (tea, coffee, alcohol, and tobacco) should be suspended or abandoned. If the patient is clearly plethoric, with a full strong pulse, he should take saline cathartics, and live upon comparatively low diet (including little animal food) until this condition is removed. When, on the other hand, the palpitation is due to an anæmic condition, the remedies are preparations of iron, aloetic purgatives, an abundance of animal food, bitter ale, the cold shower-bath, and moderate exercise.

Palsy. See PARALYSIS.

Paltock, ROBERT, born in London apparently in 1699, and educated at St Paul's School, was bred to the law, and while in Clement's Inn secured his title to remembrance by writing the wondrous tale of *Peter Wilkins, a Cornish Man*, published anonymously in 1750, and often reprinted. The authorship, known to some in 1802, remained generally a mystery till 1835, and first appeared on the title-page in 1839. Paltock died 20th March 1767. See the preface to A. H. Bullen's edition of *Peter Wilkins* (2 vols. 1884), and *Athenæum*, August 1884 to February 1885.

Paludan-Müller, FREDERIK, Danish poet, born at Kjerteminde in Fünen, on 7th February 1809, led a quiet, uneventful life, and died at Copenhagen on 29th December 1876. Whilst still a student at the university in that city he gained the ear of the public with a play, *Love at Court* (1832); a poem, *The Dancer* (1833); and a lyric drama, *Amor and Psyche* (1834; 8th ed. 1883)—all three decidedly romantic in temper, the second especially showing Byronic influence. But his fame rests on *Adam Homo* (3 vols. 1841–49; 7th ed. 1885), a humorous, didactic poem, full of deep and suggestive thought, with no small share of satiric wit and irony, and strong realistic touches, and of the most finished literary workmanship; on *Kalanus* (1854), a contrast between Alexander the Great and the Indian sage Kalanus, as representatives of Greek culture and Hindu religion, a work written in the loftiest spirit of idealism; and on *Adonis* (1874), an exquisitely finished little mythological poem. Along with *Kalanus* he published the poems *Paradise, Abel's Death, Cain, Ahasuerus,* and *Benedict of Nursia;* and he wrote also two prose romances, *The Source of Youth* (1865) and *Ivar Lykke's History* (3 vols. 1866–73). His poetical works were published in 8 vols. in 1878–79. See Georg Brandes, *Danske Digtere* (1877).

Pamir' ('roof of the world'), the nucleus of the central Asian highland system, is a lofty plateau-region, with a mean elevation of 13,000 feet, uniting the western terminations of the Himalaya and the Tian-Shan Mountains, and both with the Hindu-Kush. It is traversed by mountain-ridges that rise from 4000 to 5000 feet above the plateaus, and the culminating points attain in some cases 25,500 feet above sea-level. Between these ridges are a series of broad valleys, to which the generic name 'pamir' is given. On the west side this plateau-region sinks rapidly in terraces to the deserts of Turkestan. These lofty plateaus are exposed to great extremes of heat and cold, and are visited by terrible snow and sand storms. Nevertheless the Kirghiz drive up their flocks and herds for summer pasture, and from time immemorial traders have crossed them along celebrated routes. It was crossed by the famous Marco Polo on his journey to the court of Kublai Khan. Animal and bird life is plentiful, the moufflon having its home there. There are numerous rivers and lakes, some of the latter of great size, as Karakul, 120 sq. m., and Shivakul, 100 sq. m. See Geiger, *Die Pamirgebiete* (1887).

Pamlico Sound, a shallow body of water, some 75 by 10 to 25 miles, on the coast of North Carolina, separated from the ocean by long, narrow islands of sand, with narrow passages.

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Pampas (*Quichua*, 'plains') is a term properly confined to the immense treeless plains of the Argentine Republic, which rise, almost imperceptibly, in a series of terraces from the coast to the base of the Cordilleras. Extending some 2000 by 500 miles, they differ greatly in various districts. The north-eastern portion, in the Paraná basin, is one of the most fertile regions in the republic; and stretching from this through Buenos Ayres and the south of Cordova and Santa Fé is the rich grassy pampa-land proper, supporting great herds of cattle, horses, and sheep. The rest is for the most part waterless and sterile. The soil, which is a diluvium composed of sandy clay, and abounds in the bones of extinct mammals, is more or less impregnated with salt, especially in the west, where strips of desert, known as *travesias*, are numerous. Within recent years great tracts of pasture have been converted into farm-land, but stock-raising is still the most important industry. The half-white herdsmen are called Gauchos (q.v.).—The name Pampas is also given to the level districts of Peru, where those of the Sacramento occupy an area estimated at 180,000 sq. m., covered with primeval forest.

Pampas Grass (*Gynerium argenteum*), a grass which covers the pampas of South America. A noble grass now well known in British gardens as an ornamental plant, it is quite hardy, and its tufts have a splendid appearance. The leaves are 6 or 8 feet long, the ends arching gracefully over; the

Pampas Grass (*Gynerium argenteum*).

flowering stems 10 to 14 feet high; the panicles of flowers silvery white, and from 18 inches to 2 feet long. The male and female flowers are on separate plants; the spikelets two-flowered, one floret stalked, and the other sessile; the paleæ of the female florets elongated, awn-shaped, and woolly. The herbage is too coarse to be of value. The plant is now cultivated at Goleta, California, for the sake of its plumes, which are vended by florists for room decoration. Their culture and preparation for market form a considerable industry.—Another species of the same genus, *G. saccharoides*, a Brazilian grass, yields a considerable quantity of sugar.—A decoction of the root of *G. parviflorum* is used in Brazil to strengthen the hair.

Pampas Hare. See VISCACHA.

Pampeluna, or PAMPLONA, a fortified city of northern Spain, stands on a tributary of the Ebro, 111 miles by rail NW. of Zaragoza (Saragossa) and 50 S. by W. of Bayonne in France. It has a citadel (a copy of that of Antwerp), a Gothic cathedral (1397), a viceregal palace, a fine aqueduct, and some manufactures. It was called by the ancients *Pompeiopolis*, because built by Pompey in 68 B.C. It was taken by the Goths in 466, by the Franks in 542, and by Charlemagne in 778. From 907 it was the capital of Navarre. The town was seized by the French in 1808, but captured by Wellington in 1813. It again capitulated to the French in 1823. In the Carlist wars it was held by Queen Christina's adherents from 1836 to 1840, and in 1873–76 it was vainly attacked several times by the Carlists. Pop. 25,630.

Pamphlet, defined by Dr Johnson, himself an occasional writer of pamphlets, as 'a small book; properly a book sold unbound and only stitched,' and by him derived from the French *par un filet*, 'by a thread.' Skeat, rejecting other conjectural derivations, prefers to take the word from the name of *Pamphila*, a 1st-century historian, writer of small books. French and Germans use the word 'pamphlet' as an English importation and in its English acceptation. Hoccleve applies the name *pamflet* or *pamphilet* in 1411 to his rather long poem *De Regimine Principum*; and Caxton printed numerous *paunfletts*, but the word had not then the restricted sense it has come to bear. Any kind of matter, even metrical, may be published 'in pamphlet form;' but the term 'pamphlet' is now ordinarily applied to brief publications which as controversial are distinguished from ballads, narratives, folk-tales, chapbooks, or expository tracts. Even as thus limited, pamphlets include innumerable types and varieties—impassioned pleading for God's truth against an ungodly generation; the strenuous defence of a just cause imperilled by tyranny or fickle majorities; the mutual recriminations of irate scholars; the personal grievances of misunderstood and unrecognised inventors; the querulous polemics of circle-squarers, earth-flatteners, and other faddists; denunciations of iniquitous railway schemes or ruinous municipal undertakings; and the anonymous and scurrilous lampoons of personal malice and revenge. 'Pamphleteer,' according to Johnson 'a scribbler of small books,' suggests associations with anonymous spite or venal hack-work. Religious convulsions and political crises produce both the higher and the meaner sorts: wherever, especially since the invention of printing, people have felt strongly and bitterly, or whenever hide-bound doctrinaires have felt convinced the country was going to the dogs, pamphlets have appeared. Greeks and Romans were no strangers to this kind of literature: mediæval controversies were fought out in this way; and the humanists and reformers (Hutten and Luther, for example) did much effective work by means of pamphlets. Buchanan's *Chamæleon* and Knox's *Blast against the Monstrous Regiment of Women* were remarkable productions in this category. Amongst famous pamphlets have been reckoned Milton's *Areopagitica*, *Killing no Murder*, the *Marprelate* series, Defoe's *Shortest Way with the Dissenters*, Whately's *Historic Doubts*. The Deist controversy took largely the pamphlet form. Tom Paine's *Common Sense* had much influence on the American Revolution. The French Revolution was heralded, accompanied, and followed by swarms of pamphlets of all kinds. Wordsworth, most placid of poets, denounced the Convention of Cintra in a powerful pamphlet; Shelley's *Necessity of Atheism* led to his expulsion from Oxford. The exchange of pamphlets between Newman and Kingsley attracted the attention of all England. Chartism and the Reform Bill, Protestantism *versus* Catholicism and the Tractarians, Dissent *versus* the Church, the Sabbath Question, National Defence (as in *Dame Europa's School* and its successors), Anti-opium, Anti-liquor, Anti-vaccination, Anti-vivisection, Fair Trade and

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Free Trade, the 'C. D.' Acts, Socialism, have been very freely and fully illustrated in innumerable booklets which seek their success rather in their direct appeal to the multitude through a wide and cheap circulation, than by addressing themselves to the cultured few with exhaustive logic or the graces of style. But articles in the magazines and letters to the newspapers have largely superseded pamphleteering.

Pamphylia, anciently a country on the south coast of Asia Minor (q.v.), between Lycia and Cilicia. The inhabitants—a mixed race of aborigines, Cilicians, and Greek colonists—spoke a language the basis of which probably was Greek, but which was disfigured and corrupted by the infusion of barbaric elements. See Dr Lanckorowski, *Die Städte Pamphyliens und Pisidiens* (1890 *et seq.*).

Pan, among the Greeks, a divinity of pastures, forests, and flocks, usually described as a son of Hermes. His worship originated in Arcadia, but spread gradually over the rest of Greece, although it did not reach Athens until after Marathon. Pan is represented as having horns, a goat's beard, a crooked nose, pointed ears, a tail, and goat's feet. Sometimes he appeared to travellers, startling them with sudden fear, whence a sudden fright was called a *panic* fear. During the heat of the day he used to sleep in the shady woods, and was exceedingly wroth if his slumber was disturbed by the halloo of the hunters. He was the patron of all persons occupied in the care of cattle and of bees, in hunting and in fishing. He is also represented as fond of music, and of dancing with the forest nymphs, and as the inventor of the syrinx or Pandean pipes. Cows, goats, lambs, milk, honey, and new wine were offered to him. The fir-tree was sacred to him, and he had sanctuaries and temples in various parts of Arcadia, at Troezene, at Sicyon, at Athens, &c. The Romans identified the Greek Pan with their own god Faunus. Plutarch (*De Orac. Defectu*) is the first to tell the story that in the reign of Tiberius one Thamus a pilot, when steering near the islands of Paxæ, was commanded by a loud voice to proclaim that 'the great Pan is dead.' As soon as he had reached Palodes he cried the news aloud from the poop of his ship, whereupon was heard a great noise of lamentation, as of nature itself expressing its grief. The coincidence of this story with the birth or the crucifixion of Christ gave occasion to an explanation that it marked the end of the old world and the beginning of the new when the old oracles became dumb. Rabelais has the story, there is a well-known allusion to it in Milton's *Ode on the Nativity*, and it has been finely treated by Schiller and Mrs Browning. The Devil of popular Christian superstition owes some of his attributes to Pan.

Panamá, ISTHMUS OF, formerly called the Isthmus of Darien (q.v.), embraces the narrowest part (35 miles) of Central America, connecting Costa Rica on the W. with Colombia on the E. It now forms a department of Colombia, has an area of 31,880 sq. m., and a pop. of 285,000, with 8000 uncivilised Indians, and is traversed by a low chain of mountains, forming the barrier between the Atlantic and Pacific Oceans. Numerous streams, the largest of which is the Tuira (160 miles long, and navigable for more than 100 miles), fall into both oceans. Off the Pacific shore are numerous beautiful islands, among which Las Perlas, so called from their pearl-fisheries (now almost discontinued), Naos, and Taboga are the chief. There are no good natural harbours. The chief trading ports are Panamá (see below) and Colon (Aspinwall). The exports embrace hides, tallow, caoutchouc, indigo, vanilla, coffee, gold dust, cocoa-nuts, tortoiseshell, &c. Commerce is entirely in the hands of foreigners, and is valued at less than £1,400,000 annually. Gold, once abundant, is still worked, and copper, iron, coal, &c., exist. 'Panamá hats' are made in Ecuador and Peru.

PANAMA, the capital of the department, stands on a projecting volcanic rock on the Pacific side of the Isthmus; the massive walls the Spaniards built to protect their treasure city still stand in places. *Old Panamá*, founded in 1518, was captured and destroyed by the buccaneers under Morgan (1671). *Modern Panamá* was built two years later, 4½ miles distant from the old city. In May 1880 it had a population estimated at 15,000, the majority of Indian and negro descent, and half-breeds. During the zenith of canal work (see below) the population was estimated at 25,000 to 30,000. Fires have destroyed Panamá repeatedly, as well as its sister city Colon. The principal buildings are the cathedral (1760), a Spanish structure, built of yellow stone; the town-hall, in which the Colombians signed the declaration of their independence; and the bishop's palace (1880). Panamá is connected with Colon on the Atlantic by the Panamá Railway (48 miles long), built by Americans in 1850–55.

PANAMÁ CANAL.—The idea of connecting the Atlantic and Pacific Oceans by way of the central American isthmuses is by no means new. That for uniting them by the Isthmus of Panamá is almost coincident with Balboa's discovery of the Pacific (1513). In King's *Wonders of the World* we read: 'In the town library of Nuremberg is preserved a globe, made by John Schöner in 1520. It is remarkable that the passage through the Isthmus of Darien, so much sought after in later times, is on this globe carefully traced.' Gomera (1510–60), the historian, was the first to advocate a union of the oceans by means of a canal. Philip II. of Spain proved an implacable enemy to all such schemes. The Tehuantepec, Nicaragua, and Darien routes were discussed in the 16th century; and the Dutch, it is alleged, made complete plans for a canal over two centuries ago. But no steps were taken to carry out any plan until Ferdinand de Lesseps, of Suez fame, convened in Paris in May 1879 an international congress to discuss the plan of cutting through the Isthmus of Panamá. A plan previously prepared by De Lesseps was adopted, and a concession from the United States of Colombia to Lieutenant Lucien Napoleon Bonaparte Wyse of the French navy, who had made a hasty and partial survey, was sold to the prospective Panamá Canal Company. On February 28, 1881, the first detachment of canal employés arrived at Colon; surveys were at once made, and the building of camps, hospitals, &c. followed. In 1882 the Canal Company purchased the Panamá Railway. De Lesseps' Engineering Commission to Panamá in 1880 estimated that a canal could be made for 843,000,000 francs. De Lesseps reduced their figures to 600,000,000 francs, or £24,000,000, and announced that a *canal à niveau*, or tide-level canal, could be completed for that sum. Later he invited delegates to meet him at Panamá in 1888 for its opening. Loans followed year after year. Meantime interest charges accumulated and became burdensome, while little real progress was made. In the autumn of 1888 further borrowing became impossible. The company was forced into liquidation, January 1, 1889; its bond and share indebtedness was roughly estimated at £70,000,000, interest charges over £4,000,000, with perhaps a fifth of the real work done. There are over 800,000 holders of shares in France. Shortly after the crash, a liquidator was named by the Court of the Seine. In 1890 a commission of French and other engineers was sent to the Isthmus by him. Their report was very discouraging. Valuable

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plant estimated at about £6,000,000 was rusting away, much already useless. The tide-level cut at Colon was rapidly filling in, and the fine harbour shallowing, owing to the cut. In 1891 the government of Colombia granted to the Panamá Canal Company an extension of ten years from 1893 in which to finish their contract, provided operations should be resumed before February 1893. De Lesseps seems to have entered upon the plan without sufficient knowledge. It is also alleged that much money was squandered through extravagance and incapacity. Moreover, many hundreds of the workmen were swept away by tropical diseases, yellow and pernicious fevers, dysentery, &c., the climate of the Isthmus being pestilential and death-dealing. Indeed the Isthmus and its towns are hotbeds of malignant disease, which is distributed thence by passing merchandise to all quarters.

Great and apparently insurmountable obstacles to a tide-level canal are the marshes and quicksands on the Atlantic coast. The unruly Chagres periodically overflows, and fills the valley of the Isthmus. In 1879 a flood lasting four days swept all before it, and covered the railway with 12 feet of water. Then there are serious natural obstacles in the line of the canal, as the swamps and volcanic ledges on the Panamá side. Earthquakes, too, occur; in September 1882 much damage was done to both Isthmian cities and the Panamá Railway by a severe earthquake, whilst a tidal wave swept the islands and coast of the Gulf of Darien on the Atlantic side, causing great destruction of life and property. To natural obstacles must be added the great cost of labour and living. The long wet season of nearly eight months causes delays and damages to cuttings. See Dr W. Nelson, *Five Years at Panamá* (New York, 1889; Lond. 1891).

Panama Crimson. See DYEING.

Panathenæa, the most famous festival of Attica, celebrated at Athens in honour of Athena, patron goddess of the city. All writers who mention it speak of a Lesser and Greater Panathenæa, the former held annually, the latter every fourth year. The procession of the festival was sculptured by Phidias and his disciples on the frieze of the Parthenon.

Panax. See GINSENG.

Panchatantra, the oldest extant collection of apologues and stories in Sanskrit literature. This work is a compilation due to a Brahman named Vishnusarman, who is represented as at once the narrator of the stories and author of the book. Composed of narratives, some of which are found in different literary monuments, and of passages borrowed from legislators, moralists, and poets, the Panchatantra has been subjected to many modifications. Wilson, who first gave a detailed analysis of the work (*Trans. Roy. Asiat. Soc. of Great Britain*, i., Lond. 1827), had three widely varying MSS. before him. Kosegarten, the first editor of the Sanskrit text, found the same variety in the eleven MSS. he used. In these he recognised two distinct redactions, one simple and without ornament, the other more extended and elaborated. Neither of these is, however, the first form of the work. Benfey held that there existed a still more ancient text, from which the lost Pehlevi translation was made, and that the Panchatantra was composed subsequent to that translation. This Pehlevi version was the parent of the Arabic *Kalîlah wa Dimnah*, as also of the old Syriac version of Bickell and Benfey (1876). The book of *Kalîlah wa Dimnah* differs considerably from the Panchatantra. It is divided into eighteen chapters, of which only five (5, 7, 8, 9, 10) correspond to the five parts of our collection. The literary history of this work and its extraordinary diffusion among the languages of western Europe are sketched in the article BIDPAI.

Some of the fables contained in the Panchatantra are found in the Mahábhárata, others have their source in Buddhist books, and there exist in Sanskrit several abridgments or imitations. Of these the most ancient forms part of the Kathásaritságara ('Ocean of the Streams of Story'), composed by Somadéva about the beginning of the 12th century. The text of this work was edited by H. Brockhaus (Leip. 1839–62–66); a German translation by the same scholar was published in 1839 (Leip. 2 vols.), and one in English by Professor C. H. Tawney in 1880 (Calcutta, 2 vols.). It contains, of the Panchatantra, the first three books, three fables of the fourth, and one of the fifth. Another abridgment, in which most of the poetical quotations are omitted, is entitled *Kathámritanidhi* ('Treasure of the Ambrosia of Stories'). But the most celebrated of its imitations is the *Hitopadésa* ('Useful Instruction'), of comparatively modern date. Like Somadéva, its author, Srí Nárayana, has taken only the first three books of the Indian original; he has drawn from the last two four fables only, and inserted them in his third and fourth books.

The Panchatantra belongs to the class of works designated in India as *Nitisástras* (*sástra*, 'book of knowledge,' and *nîti*, 'conduct'), composed for the instruction of princes and all those called to take a share in the direction of public affairs. The five books of which it is composed form as many distinct parts, related to each other by an introduction in which a king, after having taken the advice of his councillors, entrusts to a Brahman the education of his three sons. The latter composes the Panchatantra for the instruction of the young princes, and by the reading of that work he succeeds in overcoming their indolence and in developing their faculties.

The first book is the longest, and has for special title *Mitrabhéda* ('The Disunion of Friends'). Its object is to acquaint kings how dangerous it is to lend an ear to the perfidious insinuations of those who seek to sow divisions between a prince and his faithful friends. The second book, entitled *Mitraprápti* ('The Acquisition of Friends'), has for its aim to show how advantageous it is to form unions and help each other. The third book, *Kákoloúkîya* ('The War of the Crows and the Owls'), shows the danger of trusting to men unknown or to enemies. The fourth, *Labdhapranasana* ('The Loss of Acquired Good'), proves that we often lose by imprudence what we had gained with difficulty. The fifth and last book, *Apartkchitakáritwa* ('Inconsiderate Conduct'), shows the danger of being too precipitate in action. A principal apologue forms the subject, or, more correctly, the framework, of each of the five books. Fables contained in that apologue, and often involved the one with the other, are related by the personages introduced. The narrative is intermingled with a multitude of sentences, maxims, remarkable thoughts, extracts from codes of legislators, heroic and other poems, and dramas.

The text of the Panchatantra has been edited by Kosegarten (2 vols. Bonn and Greifswald, 1848–59), and G. Bühler and F. Kielhorn in the 'Bombay Sanskrit' series (1868–69). There is an admirable German translation by Benfey (2 vols. Leip. 1859), a French translation, with useful notes on the sources and imitations of the stories, by Édouard Lancereau (1871). Vol. i. of Benfey's work is entirely taken up by a masterly and exhaustive introduction, the best work that has yet appeared on the sources and the diffusion of Indian fables.

Pancras, ST, the son of a heathen noble of Synnada in Phrygia, lost both parents whilst a

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boy, and was taken to Rome by an uncle, and there baptised, but immediately afterwards was slain (304) in the Diocletian persecution, being only fourteen years old. The first church that St Augustine consecrated in England was dedicated to St Pancras; it stood at Canterbury.—The London terminus of the Midland Railway, St Pancras Station, is situated in the parish of St Pancras. See G. Clinch, *Marylebone and St Pancras* (1891).

Pancreas (from the Gr. *pan*, 'all,' and *kreas*, 'flesh') is a conglomerate gland, lying transversely across the posterior wall of the abdomen, varying in length from 6 to 8 inches, having a breadth of about an inch and a half, and a thickness of from half an inch to an inch. Its usual weight is about three ounces. The head of the pancreas lies in the concavity of the duodenum. For the action of the pancreatic juice, and an illustration of the pancreas, see DIGESTION.

The diseases of the pancreas are few, and do not signify their existence by any very marked symptoms. The most common form of disease is cancerous deposit in the head of the gland, which frequently induces jaundice by obstructing the common biliary duct near its opening. An accurate diagnosis of disease of this organ is extremely difficult, and cannot lead to efficient treatment; all that can be done in these cases being to palliate the most distressing symptoms. The pancreas of ruminating animals is a favourite article of food under the name of sweetbread.

Pancsova, a town in the south of Hungary, inhabited by (1880) 17,127 Servians and Germans, stands 9 miles NE. of Belgrade, on the Temes, not far from its junction with the Danube. The people breed silkworms, brew beer, distil brandy, make starch, grind flour, &c. The Austrians took the place from the Turks in 1716, routed them there in 1739, burned the town in 1788, and in 1849 defeated the Hungarians under Kiss.

Panda (*Ailurus fulgens*), a rare and remarkable animal in the bear section of Carnivores. It lives among rocks and trees by the sides of streams at great altitudes in the south-east Himalayas, and

Panda (*Ailurus fulgens*).

in eastern Tibet. Like a large cat in size, it has long, thick, brilliant reddish-brown fur, black beneath, high pointed ears, stout plantigrade limbs, with large, very slightly retractile claws, and woolly soles. The bushy tail is almost as long as the body, and has beautiful rings of red and yellow. The molar teeth are very broad, with numerous cusps; the diet consists of fruits, roots, and other parts of plants. A captive panda in the Zoo in London sucked water like a bear, and ran like a weasel in a jumping gallop. In its native haunts it climbs trees dexterously. The call varies from a curious bird-like chirp to a loud squeal. By the large bear-like *Ailuropus melanoleucus*, with snow-white fur and black legs, the panda is linked to the bears, but in several features it is nearer the raccoons of the New World.

Pandanaceæ, a natural order of endogenous plants, wholly natives of the tropics. They are trees or bushes, often sending down adventitious roots, sometimes weak and decumbent, or climbing. The leaves are imbricated linear-lanceolate and spiny, or pinnate and palmate without spines. The flowers are unisexual, naked, polygamous, or arranged on a spadix, and wholly covering it. The stamens are numerous; the ovaries usually clustered, one-celled, each crowned with a stigma; the fruit consists of fibrous, one-seeded drupes, collected or almost combined, or of berries with many seeds. There are not quite 100 known species. Some are valuable for the fibre of their leaves, some for their edible fruit, &c. See SCREW PINE. The unexpanded leaves of *Carludovica palmata* furnish the material of which *Panama hats* are made. The tree which yields Vegetable Ivory (q.v.) is *Phytelephas macrocarpa* belonging to this order. The flowers of *Pandanus odoratissimus* are very fragrant; in India they are boiled with meat, and are regarded as aphrodisiac. It is cultivated in some parts of Japan for the sake of the perfume of the flowers, and the adventitious roots are used as substitutes for corks.

Pandavas. See MAHÁBHÁRATA.

Pandean Pipes, a series, fastened side by side, of short reeds or pipes, graduated in length so as to give out different notes when blown across their mouths. See PAN.

Pandects (Gr. *pandectai*, 'all-containing'), or the DIGEST, one of the celebrated legislative works of the Emperor Justinian (q.v.).

Pandharpur, a town of British India, 112 miles SE. of Poona, on a branch of the Kistna. It is highly revered by the Hindus on account of a temple dedicated to an incarnation of Vishnu. Pop. 16,910.

Pandit. See PUNDIT.

Pandora (i.e. the 'all-endowed'), according to Greek myth, was the first woman on the earth. When Prometheus had stolen fire from heaven Zeus instigated Hephæstus to make woman out of earth to bring vexation upon man by her graces. The gods endowed her with every gift necessary for this purpose, beauty, boldness, cunning, &c.; and Zeus sent her to Epimetheus, the brother of Prometheus, who forgot his brother's warning against accepting any gift from Zeus. A later form of the myth represents Pandora as possessing a vessel or box filled with every form of human ills, on opening which they all spread over the earth, Hope alone remaining. A still later version makes the box filled with winged blessings, which mankind would have continued to enjoy if curiosity had not prompted Pandora to open it, when all the blessings flew out, except Hope.

Pandours, a people of Servian origin who lived scattered among the mountains of Hungary, near the village of Pandour in the county of Sohl. The name used to be applied to that portion of the light-armed infantry in the Austrian service raised in the Slavonian districts on the Turkish frontier. They originally fought after the fashion of the 'free-lances,' and were a terror to the enemy whom they annoyed incessantly. Their appearance was exceedingly picturesque, being somewhat oriental in character, and their arms consisted of a musket, pistols, a Hungarian sabre, and two Turkish poniards. Their habits of brigandage and cruelty rendered them, however, as much a terror

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to the people they defended as to the enemy, and about 1750 they were put under stricter discipline, and gradually incorporated with the regular army. The name is now obsolete.

Pandulf, CARDINAL, the commissioner sent by Innocent III. to King John in 1213, who returned to England as legate (1218–21), and in 1218 was made Bishop of Norwich. Langton strongly opposed his pretensions as legate, and got his commission cancelled.

Pange Lingua (Lat., 'Now, my Tongue, the mystery telling'), one of the most remarkable of the hymns of the Roman Breviary, and like its kindred hymn, *Lauda Sion*, a most characteristic example of mediæval Latin versification. The Pange Lingua is a hymn in honour of the eucharist, and belongs to the service of the Festival of Corpus Christi. It was written by the great Angelic Doctor, Thomas Aquinas, and consists of six strophes of verses in alternate rhyme. Besides its place in the office of the Breviary, the 'Tantum ergo,' a portion of this hymn, forms part of the service called Benediction with the Blessed Sacrament, and is sung on all occasions of the exposition, procession, and other public acts of eucharistic worship.

Pangenesis. See HEREDITY.

Pangolin, or SCALY ANT-EATER, a name given to the various species of the genus Manis belonging to the mammalian order Edentata, and confined to the Oriental and Ethiopian regions. The most

Pangolin (*Manis pentadactyla*).

marked peculiarity of these animals is their covering of scale-like structures, which are really formed of numerous hairs closely fused. The pangolin is most nearly allied to the Aardvark (q.v.) of South Africa, and like it is edentate and feeds upon ants. When threatened with danger these animals roll themselves into a ball like the hedgehog.

Panicle. See GRASSES.

Panicum. See MILLET.

Pánini, the greatest known grammarian of ancient India, whose work has up to the present day remained the standard of Sanskrit grammar. Of his life little is known save that he was born near Attock. His date even has not been ascertained. Goldstücker placed him in the 7th century B.C.; Weber and Böhtlink give about 350 B.C. The precision of statement and analytical skill of his work are equally admirable. See SANSKRIT.

Panipat, a town of the Punjab, is situated 53 miles N. of Delhi, near the old bank of the Jumna, and on the great military road of northern India between Afghanistan and the Punjab. Hence it has been at various times the scene of strife between the people of India and her invaders. The *first* great battle of Panipat was fought in 1526, when Baber, at the head of 12,000 Mongols, defeated the army, 100,000 strong, of the emperor of Delhi. The *second* great battle was fought in 1556 by the Mongols under Akbar, grandson of Baber, and third of the Mogul emperors, against Hemu, an Indian general of the Afghan Sher Shah, the latter being defeated. The *third* battle was fought on 7th January 1761 between Ahmed, ruler of Afghanistan, and the till then invincible Mahrattas, who on this occasion suffered a total defeat and great slaughter. The existing town is enclosed by an old wall, and manufactures copper utensils, cloth, blankets, hardware, silver and glass ornaments. Pop. 25,022.

Panizzi, SIR ANTHONY, principal librarian of the British Museum from 1856 to 1866, was born 16th September 1797, at Brescello, in the duchy of Modena. He studied at Padua, and became an advocate, but, sharing in the revolution of 1821, had to flee. Condemned to death in absence, he settled in Liverpool, where the friendliness of Roscoe procured him employment as a teacher of Italian. Through Brougham's help he was in 1828 made professor of Italian in University College, London, and in 1831 assistant-librarian in the British Museum. As keeper of the printed books (1837) he undertook the new catalogue, and it was he who designed the new reading-room (see BRITISH MUSEUM). He was long a fast friend and correspondent of Prosper Mérimée, and died April 8, 1879, having been made K.C.B. in 1869. He retained to the end a lively interest in the cause of Italian freedom. See his Life by Fagan (1880).

Panjab. See PUNJAB.

Panjim. See GOA.

Panna, capital of a small native state in Bundelkhand, 173 miles SW. of Allahabad. Pop. of town, 14,676; of state (1881) 227,306.

Pannonia, a province of the ancient Roman empire, bounded on the N. and E. by the Danube, on the W. by the mountains of Noricum, and on the S. reaching a little way across the Save; it thus included part of modern Hungary, Slavonia, parts of Bosnia, of Croatia, and of Carniola, Styria, and Lower Austria. It received its name from the Pannonians, a race of doubtful origin, but who at first dwelt in the country between the Dalmatian Mountains and the Save, in modern Bosnia, and afterwards more to the south-east in Mœsia. The Roman arms were first turned against them and their neighbours, the Iapydes, by Augustus in 35 B.C. After repeated defeats the Pannonians settled about 8 A.D. in the more northern countries, which received their name, and of which the former inhabitants, the Celtic Boii, had been in great part destroyed in Cæsar's time. The country was now formed into a Roman province. Great numbers of the Pannonian youth were drafted into the Roman legions. In the 5th century it was transferred from the Western to the Eastern Empire, and afterwards given up to the Huns. After Attila's death, in 453, the Ostrogoths obtained possession of it. The Longobards under Alboin made themselves masters of it in 527, and relinquished it to the Avari upon commencing their expedition to Italy. Slavonian tribes also settled in the south. Charlemagne brought it under his sceptre. In the reigns of his successors the Slavonians spread northward, and the country became a part of the great Moravian kingdom, till the Magyars or Hungarians took it in the end of the 9th century.

Panorama (Gr. *pan*, 'all,' and *horama*, 'a view'), a word coined by or for Barker in 1788 to mean 'a view all round.' The word is used loosely for all that the eye can see at once, or by a person's simply turning round, from an eminence; also for a series of pictures, such for example as what is called a 'panorama of the Rhine,' folded up in a kind of portfolio. The name is also given to a continuous series of painted pictures exhibited at one end of a room, and moved so as successively to pass into and out of the field of view by some mechanical arrangement. This when seen from a distance

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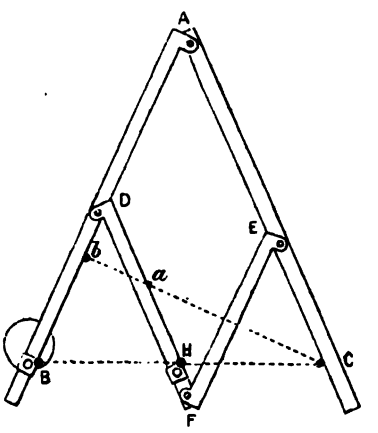
through an opening, and under a combination of direct and reflected light (as invented by Daguerre and Bouton), is called a *diorama*. But the word panorama properly belongs to what is now called, by way of distinction, *cyclorama*—a continuous painting on the interior of a cylindrical surface, the spectator standing in the centre. It is claimed that Breising of Danzig proposed such a plan. But Robert Barker (1739–1806), an Irish painter resident in Edinburgh, is entitled to the credit of having not merely conceived the method, but of having successfully carried it out on a large scale; his first 'panorama' being a view of Edinburgh, painted in water-colour on paper pasted on a cylinder of canvas 25 feet in diameter, and exhibited in Edinburgh in 1788. This he took to London in 1789; and in 1793 he erected a special building, one of the rooms of which admitted a circular picture 90 feet in diameter. Robert Fulton is said to have painted and exhibited shortly after this the first panorama seen in Paris. But on the Continent the panorama in this sense first became very popular after the Franco-German war of 1870–71. In various towns of Germany and in Paris panoramas of the war were exhibited in buildings specially built for the purpose; the Parisian one of the siege of Paris being enormously successful. In the United States also large panoramas have been exhibited, the subjects being battle-scenes from the civil war. A large panorama of the battle of Bannockburn, painted by Fleischer of Munich, was shown in a specially erected building in Glasgow in 1888; and one of the battle of Trafalgar, by the same artist, was a feature of the Edinburgh Exhibition of 1890. In the same year Niagara was brought on canvas to London, and in 1891 this was succeeded by a view of Jerusalem on the day of the Crucifixion. *Georama* is the name given to a delineation of the earth's surface on the interior of a hollow sphere, the spectator being in the centre of the whole (see GLOBES).

Panormus. See PALERMO.

Panslavism, a movement with the aim of drawing closer together all the various races of Slavonic stock, and combining their influence in political and other directions. Some extreme Slavophils have even proposed an actual amalgamation in nationality, language, literature, and religion. The first literary representative was the Slovak poet Kollar (q.v.), and the movement showed first in Bohemia (q.v.), where the philological and historical work of Schafarik and Palácky contributed to give it impetus. The Poles of Prussia resisted Germanisation; Serbs, Slovaks, and Croats asserted their rights against their Magyar masters; and the still less fortunate Slavs of Turkey gladly swelled the chorus. But at the first great Panslavic congress at Prague in 1848 the most convenient medium of intercourse proved to be the tongue of the alien Germans! Russia, after being called to suppress the Hungarian revolution, came to be regarded as the protector of all Slavs; and the papers and periodicals of Russian Slavophils, such as Aksakoff and Katkoff, heartily promoted this growing feeling. The growing dominance of Russia caused the Poles to withdraw their hearty support, and even the Czechs began to fear that Panslavism, under Russian guidance, looked like Panrussism. There were no Poles at the second congress at Moscow in 1867; but Russia found a most receptive field for her propaganda in Bulgaria, Servia, and Macedonia. And in the recurrent crises of the Eastern Question (q.v.) Russia became more pronouncedly the protector of all Eastern Christians. The Austrian Slavs felt themselves put into the background by the re-constitution of the Austro-Hungarian monarchy in 1867, which gave so much more power to the Magyars. The war in the Balkan Peninsula in 1875–78 was doubtless largely due to Panslavist intrigue as well as to Christian grievances; but the rearrangements that have taken effect since the Berlin treaty, especially the resolute self-assertion of the Bulgarians, have somewhat disillusioned Russian Panslavists. See SLAVS, RUSSIA; and Häusler, *Der Panslawismus* (Berlin, 1886 *et seq.*).

Pansy. See VIOLET.

Pantagraph, or PANTOGRAPH (Gr. *panta*, 'all;' *graphein*, 'to delineate'), an instrument invented for the purpose of making copies, reduced or enlarged, of drawings or plans. It is made in various forms, one of which is shown in the figure. Four rods are so hinged to one another that AE is equal to DF, and AD to EF; hence ADFE is always a parallelogram. If from a given point C on AE any straight line BH (or *a*, *b*) be drawn, cutting the other arms, the triangle ABC will always, no matter how the arms of the instrument be moved, be equal to the triangle DBH. It follows that, if the instrument be pivoted on a point at B (usually by a weight), a pencil-point inserted at H and a tracing-point at C, and the latter traced over the lines of a drawing, the pencil-point at H will trace a reduced copy of the drawing. The proportion of the reduction will be as BH is to BC. B and H are made to slide on their respective rods, so that any proportion of reduction can be made. By changing the places of the pencil and tracing-point, an enlarged copy may be made. The instrument is fitted with little castors to facilitate its free motion. The pantagraph was invented by the Jesuit Christoph Scheiner prior to 1631, and improved by Professor W. Wallace of Edinburgh prior to 1831.



Enlargements or reductions can now be done so much more accurately by means of photography that the pantagraph is nearly obsolete. See COPYING.

Pantellaria, a volcanic island in the Mediterranean, 36 miles in circumference, and lying 60 miles SW. of the Sicilian coast. The chief products are wine, oil, cotton, and fruit.

Panthalops. See CHIRU.

Panthays, a Mohammedan community occupying the province of Yun-nan in the south-west of China, who asserted their independence in 1855. In 1859 they captured Talifoo, the second city of the province, and in 1858 the capital. Their leader Wen-sosi (King Suleiman) established his authority over about 4,000,000 of people, of whom not above a tenth were Mohammedans. In 1866 the Chinese government recognised the independence of the Panthays, and in 1872 their king sent his son Hassan on a mission to Europe. Meanwhile the Chinese again attacked the Panthays, defeated them utterly, and finally suppressed their empire. Panthays is

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an anglicised form of *Pan-si*, the name by which the Mohammedans called themselves.

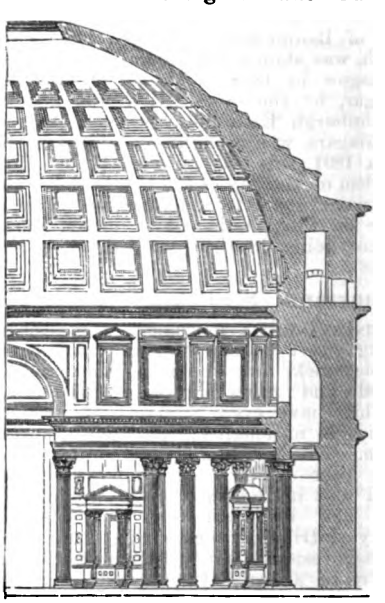
Pantheism (Gr. *pan*, 'all,' and *theos*, 'God'), the name given to that system of speculation which, in its spiritual form, identifies the universe with God (*akosmism*), and, in its more material form, God with the universe. It is only the latter kind of pantheism that is logically open to the accusation of atheism; the former has often been the expression of a profound religiosity. The word Pantheist is comparatively modern, and seems to have been coined by the Deist John Toland in 1705, and is used shortly after that date by his opponents and orthodox writers like Waterland. Earlier pantheistic systems, such as Spinoza's, were regularly assailed under the name of atheism. But the antiquity of this mode of belief is undoubtedly great; it is prevalent in one of the oldest known civilisations in the world—the Hindu. Though it may dimly underlie various polytheistic systems, it is obviously in any definite shape a later development of thought than polytheism, and most probably originated in the attempt to divest the popular system of its grosser features, and to give it a form that would satisfy the requirements of philosophical speculation. Hindu pantheism as *akosmism* is taught especially by the Upanishads, the Vedánta and Yoga philosophies, and by those poetical works which embody the doctrines of these systems; for instance, the Bhagavad Gítá, which follows the Yoga doctrine. It is poetical and religious, rather than scientific, at least in its phraseology; but it is substantially similar to the more logical forms developed in Europe. The Hindu thinker regards man as born into a world of illusions and entanglements, from which his great aim should be to deliver himself. Neither sense nor reason, however, is capable of helping him; only through long-continued, rigorous, and holy contemplation of the supreme unity (Brahma) can he become emancipated from the deceptive influence of phenomena, and fit to apprehend that he and they are alike but evanescent modes of existence assumed by that infinite, eternal, and unchangeable Spirit who is all in all. Hindu pantheism is thus spiritual in its character; matter and (finite) mind are both alike absorbed in the fathomless abyss of illimitable and absolute being. Buddhism (q.v.) denies or ignores the existence of God, but in many modes of regarding the universe is rather akin to pantheism than to absolute atheism. Sufism is a pantheist outgrowth of Islam.

Greek pantheism, though it doubtless originated in the same way as that of India, is at once more varied in its form, and more ratiocinative in its method of exposition. The philosophy of Anaximander may be described as a system of atheistic physics or of materialistic pantheism. Xenophanes, the founder of the Eleatic School (q.v.), has been held to be the first classical thinker who promulgated the higher or idealistic form of pantheism. Alexandrian Neoplatonism is substantially pantheistic; the universal reason and the world-soul of mediæval thinkers have the same tendency.

The Mosaic account of the Creation (q.v.) of all things out of nothing by God expressly excludes any pantheistic cosmogony; and Christian controversialists strenuously assert against every form of pantheism that it involves an antichristian theory of the origin of Evil (q.v.), subverts the personality of God and man, renders free-will impossible (see WILL), and destroys all real moral responsibility. Many heresiarchs have been pantheists. Gnosticism is based on an essentially pantheistic doctrine of emanation. Dionysius (q.v.) the Areopagite and Scotus Erigena (q.v.) were pantheists within the Christian fold; and the later Christian Mysticism (q.v.) has a highly pantheistic flavour (see ECKHART, BOEHME). Bruno, Vanini, and Paracelsus were outspoken pantheists; and there were various minor pantheistic sects in the middle ages. Spinoza is perhaps the greatest, certainly the most rigorous and precise of the whole class that either the ancient or the modern world has seen. Schelling's Nature-Philosophy proposed to limit the meaning of the term pantheism to the doctrine of the immanence of all things in God, but leaving doubtful the precise scope of what was meant by immanence; and some forms of Hegelianism are directly pantheistic in character. Neither England, France, nor America has produced a single great pantheistic philosopher; but there is an immense amount of pantheistic sentiment floating about in the poetry, criticism, theology, and even in the speculative thinking of these and all European countries in the present age.

See the articles on the thinkers mentioned, and those on PHILOSOPHY, RELIGION, and THEISM; the works on Pantheism by Jäsche (1826–32), Böhmer (1851), Weissenborn (1859), and Driesenberg (1880); Saisset, *Modern Pantheism* (Eng. trans. 1863); Fellens, *Le Panthéisme* (1873); Hunt, *Pantheism and Christianity* (1866; 2d ed. 1884); Flint, *Anti-Theistic Theories* (1877); Plumptre, *History of Pantheism* (2 vols. 1881).

Pantheon (Gr. *pan'theion*), a temple built in a modified Corinthian style with a great vaulted roof, dedicated to all the gods. The 'Pantheon'



Half-section of Pantheon (from Fergusson).

of Rome is the only ancient edifice in Rome that has been perfectly preserved, and is lighted through one aperture in the centre of its magnificent dome. It was erected by Agrippa, son-in-law of Augustus, 27 B.C. In 610 it was consecrated as a church, and is known as Santa Maria Rotonda. Under Pope Urban VIII. the architect Bernini erected on it two little Campaniles, called in derision his 'ass's ears.' Judicious restorations were made by Pius IX., and the ass's ears have been removed. The church is used as a place of sepulture for great Italians.—The Panthéon at Paris, built in 1764 as the church of St Geneviève, became famous as the mausoleum of famous men. From 1851 to 1885 it was again a church.

Panther. See LEOPARD, PUMA.

Pantograph. See PANTAGRAPH.

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Pantomime, among the ancient Romans, denoted not a spectacle but a person. The pantomimes were a class of actors who acted wholly by mimicry in gesture, movements, and posturings, corresponding therefore pretty closely to the modern ballet-dancers. When they first made their appearance in Rome cannot be ascertained; probably the *histriones* (Etrusc. *hister*, 'a dancer') brought from Etruria to Rome 364 B.C. were pantomimes; but the name does not once occur during the republic, though it is common enough from the very dawn of the empire. Augustus showed great favour to this class of performers, and is consequently supposed by some writers to have been himself the inventor of the art of dumb acting. The most celebrated pantomimes of the Augustan age were Bathyllus (a freedman of Mæcenas), Pylades, and Hylas. The class soon spread over all Italy and the provinces, and became so popular with the Roman nobles and knights that Tiberius reckoned it necessary to administer a check to their vanity, by issuing a decree forbidding the aristocracy to frequent their houses, or to be seen walking with them in the streets. Under Caligula they were again received into the imperial favour; and Nero, who carried every unworthy weakness and vice to the extremity of caricature, himself acted as a pantomime. From this period they enjoyed uninterrupted popularity as long as paganism held sway in the empire.

As the pantomimes wore masks, no facial mimicry was possible; everything depended on the movements of the body. It was the hands and fingers chiefly that spoke; hence the expressions, *manus loquacissimæ, digiti clamosi*, &c. To such perfection was this art carried that it is said the pantomimes could give a finer and more precise expression to passion and action than the poets themselves. The subjects thus represented in dumb show were always mythological, and consequently pretty well known to the spectators. The dress of the actors was made to reveal, and not to conceal, the beauties of their person; and as, after the 2d century, women began to appear in public as pantomimes, the effect, as may easily be supposed, of their costume, or lack of costume, was prejudicial to morality. Hence pantomimic exhibitions were denounced by the early Christian writers, as they were even by pagan moralists like Juvenal.

The pastoral drama in mediæval Italy gave birth to the opera, and already in the 16th century we find on the Spanish stage ballets with allegorical figures. Into France also about the same time the ballet was introduced. But the improvised Italian comedy was already familiarly known far beyond Italy, with its conventional comic figures, Pantalone and Arlecchino. In England the mask and so-called opera of the 17th century supplied the place of the modern pantomime, which grew out of an attempt to reproduce a popular light dramatic entertainment, varied with song and dance, itself the parent of the modern French *vaudeville*. Colley Cibber mentions as the first example a piece on the *Loves of Mars and Venus*. Geneste gives the year 1723 as the commencement of pantomime in England, with *Harlequin Dr Faustus* by John Thurmond, presented at Drury Lane. John Rich (1681–1781) produced splendid pantomimes at Lincoln's Inn Fields and Covent Garden, and from that time this form of entertainment became a traditional institution.

In the older English pantomimes the harlequin played a serious as well as merely comic part; columbine (originally his daughter) was a village maiden whose lover was pursued by the constables —the prototypes of the modern policemen. The predominance of the clown seems to be a modern development, mainly due to the exceptional ability of Joseph Grimaldi. Now the chief reliance of the manager is on scenic and spectacular effects, large sums of money being lavished on the *mise en scène*.

Pa'oli, PASQUALE DE, a famous Corsican patriot, was born in 1726 at Morosaglia in Corsica, son of that Giacinto Paoli who fought bravely, but without success, for independence against the Genoese and their French allies, and died at Naples in 1756. Thither he was carried in 1739 by his father, but returned to take part in the heroic struggle of his country, and in July 1755 was appointed to the chief command in a full assembly of the people. He struggled bravely against disaffection within and a powerful enemy without, governed the island with rare wisdom and moderation, and would have achieved the independence of Corsica had not the Genoese sold it in 1768 to France. For a year he held out against a French army, under the Comte de Vaux, of 22,000 men, but was at length overpowered and forced to make his escape to England, where he was warmly received and granted a pension by the crown. Boswell, who had visited him in Corsica, introduced him to Dr Johnson, who described him as having 'the loftiest port of any man he had ever seen.' The two became warm friends; at Paoli's house Johnson wrote to Mrs Thrale he loved to dine. Twenty years later the French Revolution recalled Paoli to Corsica, of which, as a free department of France, he consented to become lieutenant-general and governor; but the excesses of the Convention soon alienated his sympathies, and he organised a fresh insurrection. Despairing of maintaining unaided the independence of the island, he promoted its union with England, but failed to obtain the post of viceroy, and returned a disappointed man to England in 1796. He died near London, 5th February 1807; and in 1889 his remains were exhumed from Old St Pancras Churchyard, and reinterred in his native island.

See Boswell's *Account of Corsica* (1768), and the Lives of Paoli by Arrighi (Paris, 1843), Klose (Brunswick, 1853), Bartoli (Ajaccio, 1867), and Oria (Genoa, 1869).

Pa'pa (Lat., 'father'), the Latin form of the title now, in the Western Church, given exclusively to the Bishop of Rome (see POPE). Originally, however, meaning simply 'father,' it was given indiscriminately to all bishops. In the Greek Church, whether in Greece Proper or in Russia, papa is the common appellation of the clergy.

Papacy. See POPE.

Papain is a nitrogenous body, isolated from the juice of the tropical Papaw (q.v.). The juice from which it is extracted is a milky, white, inodorous fluid, obtained by making incisions in the ripe fruit. From this papaïn is isolated by precipitation with alcohol after the fatty matters present have been removed. The juice has been for a long time used in the West Indies for making meat tender; but it has only recently been shown that papaïn possesses, like pepsin and trypsin, the power of digesting meat-fibre; and this digestion will go on in an alkaline, a neutral, or an acid solution. Hence it belongs to the group of digestive ferments, and like them is employed in some cases of dyspepsia, being either administered internally or employed for the pre-digestion of food. It has also been used for the removal of warts and for the solution of the 'false membrane' in cases of diphtheria.

Papal States. See CHURCH (STATES OF THE).

Papaveraceæ, a natural order of exogenous plants, herbaceous or half shrubby, usually with a milky or coloured juice. The leaves are alternate,

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without stipules; the flowers on long, one-flowered stalks. The fruit is pod-shaped or capsular, the seeds numerous (see POPPY). The order is distinguished for narcotic properties. Opium (q.v.) is its most important product. The juice of Celandine (q.v.) is very acrid. The Blood-root or Sanguinaria (q.v.) is another representative of the order. A number of species are used in their native countries for medicinal purposes. The seeds yield fixed oil, which, with the exception of that obtained from *Argemone Mexicana*, is quite bland. The flowers of many species are large and showy, most frequently white or yellow, sometimes red. There are in all about 130 known species, natives of all quarters of the world, and of tropical and temperate climates, but they abound most of all in Europe.

Papaw (*Carica papaya*), a small South American tree of the natural order Passifloraceæ (formerly made the type of a small family, Papayaceæ), which has now been introduced into many tropical and subtropical countries. The fruit is eaten either raw or boiled. The seeds when chewed have in a high degree the pungency of cresses. The powdered seeds and the juice of the unripe fruit are most powerful anthelmintics. The juice of the fruit and the sap of the tree render tough meat tender (see PAPAÏN); even the exhalations from the tree have this property, and joints of meat, fowls, &c. are hung among its branches to prepare them for the table. It bears fruit all the year, and is exceedingly prolific. The *Chamburu* (*C. digitata*), another species of the same genus, a native of Brazil, is remarkable for the extremely acrid and poisonous character of its juice, and the disgusting stercoraceous odour of its flowers.—In the United States the name Papaw is given to the *Asimina triloba*, a small tree of the natural order Anonaceæ, the fruit of which, a large oval berry, 3 inches long, with soft, insipid pulp, is eaten by negroes, but not generally relished by others. All parts of the plant have a rank smell.

Papenburg, a small port in the north-west of the province of Hanover, 25 miles W. of Oldenburg by rail and near the Ems, with which it is connected by canals. Pop. 6916. In the neighbourhood are extensive moors.

Paper. The earliest paper was doubtless that made from Egyptian Papyrus (q.v.), whence all similar writing material is named. The papyrus paper used to be described as being made of the thin pellicles lying between the rind and the pith: now it is known to have been made of slices of the cellular pith laid lengthwise side by side, whereon other layers were laid crosswise, the whole moistened with Nile water, pressed and dried, and smoothed by being rubbed with ivory or a smooth shell. The papyrus paper was superseded in Europe by paper of other fibrous matter gradually between the 10th and 11th centuries (see PALÆOGRAPHY). At a remote antiquity the Chinese made paper of the bast of a special mulberry-tree, of sprouts of bamboo, and of Chinese grass (see BŒHMERIA). According to Fang Mi-Chih, author of the Encyclopædia *T'ung-ya*, the Chinese at first wrote on bamboo-boards; but for 300 years before and after Christ the usual writing material was paper made of silk-waste, solidified in some way not described. The inventor of paper made of vegetable fibre was the statesman Ts'ai Lun, born in Kwei-yang, in the province of Hu-nan, who in 89 A.D. was in charge of the imperial arsenals. In 105 A.D. it is expressly testified that he had succeeded in making paper of bark, of hemp, of rags, and of old fishing-nets. The governor of Samarkand, returning from a victorious expedition into China in 751 A.D., brought back amongst his prisoners of war artisans who enabled him to establish a paper manufactory at Samarkand. Here Persians learned the mystery, and soon were making paper of old linen cloths. The demand rapidly increased, and new paper-works were at work in 795 at Bagdad, where the manufacture was carried on till the 15th century. Soon paper-making was practised in Damascus, Egypt, and along the north coast of Africa; and ere long this paper, to which the names of *papyrus* and *charta* were transferred, was imported into Europe, where it was generally known as *Charta Damascena*, *bombycina*, *cuttunea*, and *gossypina*. From the latter adjectives it has currently been held that the earliest paper was made of the pulp of crude cotton-wool, and that this was only gradually superseded by rag pulp. But the researches of Wiesner and Karabacek on 12,500 MSS. brought to Vienna from the Fayûm in 1884 by Archduke Rainer have proved that this is an error. There never was any paper made by Arabs from cotton-wool; the *charta cuttunea* was all made of rags, and called 'cottony,' probably only from its resemblance to fine cotton cloth. The first manufacture of rag paper in Europe was in Spain under the Moors; in 1154 there was a mill at Jativa. But soon after traces of paper-making are found in Italy, France, and Germany. In England there is said to have been a paper-mill at Stevenage in Hertford in 1460, but little is known of the history of paper-making in England till about 1558, when there was a well-known mill at Dartford. Rag paper had, however, been commonly in use since the 14th century.

The art of paper-making is one of the most useful that has been invented, and paper has acquired a degree of importance with which it would not have been credited in the 18th century. It has been well observed that paper has contributed more to the advancement of the human race than any other material employed in the arts, and its manufacture constitutes an industry depending more closely than any other on the march of civilisation. Its uses are now beyond number; the demand for it is so general that it has become an article of prime necessity, and one that is daily entering more and more largely into the ordinary wants and ordinary life of all classes. Large as the make of paper is in the United Kingdom, it is not applied to so many and general uses as paper and paper-pulp is in the United States, Japan, and some of the European countries. In the paper trade, as in other mechanical industries, there has been great progress made in the last half-century. Chemists and mechanics have each contributed their part. The former have furnished improved methods for washing, bleaching, and colouring the paper stock, which must yield a different product from what was made by the ancients; while the mechanical improvements also have been many, both for boiling, running out, drying, and finishing the pulp.

The vegetable substances from which paper can be made are innumerable, but the difficulties are to obtain them at a sufficiently low price to be used profitably and to secure a continuous supply. Many books and newspapers have been printed entirely of one material, such as bamboo, straw, jute, *Phormium tenax*, maize leaves, esparto, &c.: at the Paris Exhibition of 1889 a paper-maker showed more than sixty webs or rolls of paper, each made from a different vegetable fibre. Books, again, have been published which were composed of several hundred leaves, all of a different fibre. In Japan a species of mulberry osier is grown specially for its bark for paper-making. But the substances available in Europe are few that can be had in quantity at a low price.

The multitude of vegetable fibres that have been suggested for the use of the paper-maker is

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bewildering, but of the number only two have come into use to any general extent; these are esparto and wood-pulp. The best sources of fibre for the paper-maker's use are linen and cotton rags for white paper, and hempen cordage for brown; but the modern uses of paper have become so numerous that rags are no longer available in sufficient quantities for paper-making. Having regard to the composition of paper, the supply would at first seem to be illimitable, inasmuch as woody fibre is amongst the most common of vegetable things. Practice, however, soon teaches the important lessons (1) that not all woody fibre is equally well adapted for the production of paper, and (2) that many vegetable growths are built up of admirable cellulose for the paper-maker's use, but yield it with such trouble and at such cost as to be wholly unremunerative. Much caustic soda or soda-ash is required in the preparation of many fibres.

Raw fibre may be divided into four classes: (1) that which is easily reduced and easily bleached; (2) that which is difficult to bleach; (3) that which is difficult to reduce, but easily bleached; and (4) that wherein perfect bleaching affects the integrity of the fibre. The longer the fibres and the more intricate the mixture of them when wet, the stronger will be the sheet of paper when dry. The shorter the fibres, the less pliable will they become with water, as in the case of ground wood, and the less will be the pressure which individual fibres exert on each other, and the more brittle will the paper sheet turn out.

Various early attempts to employ Esparto (q.v.) for paper-making are recorded. One patent dates back to 1839, and paper made of it was shown at the London Exhibition in 1851. But to the late Mr T. Routledge is mainly due its extensive employment by the trade. He commenced with a few tons at the Eynsham Mills in 1856, and the paper for the number of the Society of Arts weekly journal for November 28 of that year was made of it. For several years the makers looked very coldly on this new material, but gradually by the aid of Mr Pirie, Mr E. Lloyd, and others it became universally adopted. From an import of 891 tons in 1861 it has gradually increased as follows: in 1870, 89,156 tons; 1880, 191,229 tons; and 1890, 217,048 tons. The United Kingdom has hitherto monopolised the supply. Esparto is treated much like straw, but does not require as much soda-ash and chlorine to bleach it. The fibres are easily dissolved and bleached by chemicals. They felt readily and yield an excellent pulp, which is employed alone, or mixed with rags, wood-pulp, or straw. It furnishes a paper pliant, resistant, transparent, and of great purity, thicker than other papers of the same weight, and forming a good printing and writing substance.

The culms of various cereal grasses are employed where obtainable; rice-straw in Asia, wheat, oat, and other kinds of straw in Europe. Straw was used a century ago for paper-making, but its extensive use is of comparatively recent date. For low papers it commands a market, but as a mixer it is inferior to esparto, the internodes or knots being exceedingly troublesome and difficult to get rid of. The deficiency in the supply of rags and the absence of any cheap substance to supplement esparto have led to a great run upon wood-pulp in the last few years for the paper-mills in Great Britain and most other countries. Its manufacture and use dates practically back only to about 1870; indeed its general adoption may be referred to the ten years later. Although not all that could be wished for as an adjunct or filler, its introduction and employment have proved eminently useful. The conifers giving the strongest and toughest fibre seem to be best adapted for conversion into pulp, although many other species are used. The production has centred chiefly in the two Scandinavian countries of Norway and Sweden. From these Britain yearly receives about 140,000 tons of wood-pulp, besides what they ship to other countries. They also make a large quantity of paper and pasteboard for export. The quantity and value of the paper materials received by Britain in 1889 were:

	Tons.		
Rags	42,442	value	£426,322
Esparto, &c.	217,256	"	1,090,266
Wood-pulp	122,179	"	690,092
Total	381,878		£2,207,280

The idea of making a paper-pulp of wood was repeatedly mooted in the early part of the 19th century. A patent was granted to some paper-makers in Italy in 1826. Some years later the idea was revived in improvements in Great Britain by Desgrand, Johnson, Newton, and others. Mr Houghton took out a patent in 1857. But the mechanical process of Volter of Heidenheim was that which gave the principal impetus to the use of wood-pulp. At first the wood was simply rubbed down into pulp against the periphery of a wheel with a rough surface; but now by improved chemical appliances a better pulp is produced, and the manufacture has become generally adopted in Europe and America, adding largely to the value of their forests. Wood-pulp is admirably adapted as a principal ingredient in the manufacture of cheap paper. It is deficient in fibre, but a moderate admixture of rags, esparto, or other fibrous material strengthens it. It was about 1873 that wood-pulp began to be introduced in England as a paper material. At first only 12,000 tons could be got rid of yearly, but in 1890 as much as 137,837 tons was received, chiefly from Sweden and Norway. Much of the paper made is used up a second time. Koop's patent for reworking old waste-paper was carried on in the earlier years of the 19th century at the Neckinger Mills, Bermondsey. The process of manufacture then would seem to have been faulty, the paper made being found unfit for use, and the mill was sold. The process has, however, been brought extensively into use of late years, old newspapers and books forming much of the material for repulping. Cotton and linen rags are one of the mainstays of the paper-maker, and all countries are drawing largely on this waste substance. In Great Britain, unlike sunny climes, woollen clothing is more generally worn than cotton and linen, hence these used vegetable fibres are not so plentiful with us as in Asia and the states of southern Europe. British imports of foreign rags have been largely on the increase: they were 29,642 tons, valued at £451,762, in 1880, and 34,889 tons, valued at £354,306, in 1890; but these are principally reshipped. In 1889, 58,860 tons of British rags and materials for paper were exported, valued at £473,254, and 39,122 tons of foreign rags of the value of £345,212.

The prices of all paper-making materials have fallen greatly since 1875. Rags have dropped from £17, 6s. in 1875 to £11, 6s. per ton; esparto and other materials from £8 to £5, 9s. per ton. Even with this reduction in price, a great impetus has been given to the use of straw and wood-pulp. The demand for paper continues great. Some of the London daily journals consume 100 tons weekly; but as they sell at low prices the paper they use must be cheap. In order to reduce the price many makers introduce into their pulp sawdust and various mineral matters, such as kaolin or china clay. Very often 25 to 30 per cent. of such substances is introduced into these loaded papers, which do for cheap journals, the sheets of which have hence no solidity. But if such papers

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are used for book-work they have no durability, and are also injurious to the type. Another cause which contributes quite as much to the bad quality of many modern papers is the too rapid desiccation which the sheets undergo in the preparation of machine-sized paper. Admitting that many of the papers now made are infinitely finer, more beautiful, and above all whiter than those made in former times, it is equally true that in general machine-made papers possess less strength than the old hand-made papers. Paper of pure and good quality ought not to leave after burning more than 2 per cent. of ash.

The question for consideration as to the future is whether raw material enough can be obtained in quantity to keep our mills going, since esparto must gradually fail, and wood-pulp and rags will alone remain to us, unless some new, cheap, and abundant vegetable fibre can be met with. About 90,000 tons of rags are collected in Britain, but they are chiefly of cotton fabrics, and even these are now much drawn upon for other purposes. How much longer will Belgium, France, and Germany be disposed to part with their rags? and without rags wood-pulp is useless, however plentiful it may be.

The varieties of paper made are chiefly the following four classes: (1) news and printing papers; (2) writing-papers of various kinds, blue, cream, and yellow laid, and wove and tinted, and for account-books, &c.; (3) wrapping or packing papers, brown and purple, heavy manilla for cartridge and bags; (4) miscellaneous, such as light copying, tissue, and pottery papers, blotting and filtering, cigarette, &c. Lastly, there are all kinds of cardboards and millboards made. The following enumeration shows the principal kinds of papers, &c. made in the British mills; but the list might be extended to one or two thousand names of various kinds and qualities. Account-book, backing, bag-papers, bank-note and bill, blottings, boards, bowl-papers, browns (heavy and cutting), butter, caps (brown for bags), cards for looms, carpet-felt, cartridge, casings, chart-papers, cheques, cigarette, collar, coloured, copyings, drawings, drying royals, duplex, enamelled, engine-boards (glazed and milled, paste and portmanteau), envelope-paper, filtering, fly-papers, foil or tin-foil, grocery, gun-wadding, hosiery, lithographic, loans, long elephants, manifold, manillas, marbled, middles (browns), mill wrappers, music, news or printings, parchment, pin and needle, plate, railway-ticket, royal hands (gray, brown, blue, and white), sampling, skips, small hands (browns), tea-paper, tissues, tobacco, tracings, tube-paper, waterproof, wrapping, writing. It is on record that in 1772 there were sixty varieties of paper made from as many different materials, and ten or twelve years later the number had been extended to 103. In those days all paper was manufactured by hand, each sheet separately. The rags were pulped in mortars by trip-hammers, and several days were required to turn out a sample of dry finished paper. The workman dipped a rectangular sieve or mould into the vat and deposited the sheet of fluid pulp on a piece of felt to dry.

This simple mode of manufacture, which is still largely practised in Holland and Italy, has been superseded very generally by continuous machines, and only a small quantity of paper for special books, *editions-de-luxe*, and the like, besides a superior writing, bank-note, and drawing paper is now made by hand in England. Millboards (q.v.) and pasteboard or cardboard were formerly chiefly made for bookbinding; but now they are much in demand for box-making, machine, packing, and other purposes. Over 50,000 tons of straw and wood board are imported from Germany, Holland, Belgium, and other countries, besides what is made in Britain.

The various machines for making paper in continuous lengths are wonderful productions of mechanical skill, being almost automatic in their action, and they work with marvellous exactness. These machines consist of contrivances for causing an equal supply of pulp to flow upon an endless wire-gauze apron, which revolves and carries on the paper until it is received on an endless sheet of felt, passing around and between large couching-cylinders. These machines have now been brought to such perfection that paper can be made in one continuous roll or web of any length, and before leaving the machine is sized, dried, calendered, hot-pressed, and cut into sheets.

At the Edinburgh Exhibition in 1886 a web of paper was shown five miles long, and at the Pittsburgh Exhibition there was a roll 14 miles long, 18 inches wide, which weighed 2658 lb. Some of the machines are 75 to 100 feet long and 126 inches wide, requiring a building to themselves, and making a sheet of paper 7 feet in width.

Fig. 1 is a side-view of a continuous paper-making machine, and fig. 2 a vertical one. The principle of the machine is very simple: it contains a pulp-vat, A, with a hog or wheel inside to agitate the pulp, and an arrangement for pouring the pulp over the wire-gauze mould, B, B, B, B, which, instead of being in single squares, as in the hand-process, is an endless sheet moving round two rollers, *a*, *b*, which keep it stretched out and revolving when in operation. Under the part which receives the pulp there is a series of small brass rollers, *d* (fig. 1); these, being nearly close together, keep it perfectly level—a most necessary condition; besides which there is a shallow trough, *ee* (fig. 1), called the *save all*, which catches and retains the water that always escapes with some pulp in suspension; and an arrangement of suction boxes and tubes, *f*, *f*, *f* (fig. 1), worked by air-pumps, which draw much of the water out as the pulp passes over them. The pulp is kept from running over the sides by straps called *deckles*, which are also endless bands, usually of vulcanised india-rubber, carried round moving rollers so that they travel with the wire-gauze, and therefore offer no resistance to it. In addition to all this the framework on which the surface of the wire-gauze rests has a shoggling motion, or side-shake, which has an important effect in working the fibres together before the pulp finally settles down. When it reaches the *couching-rolls*, which press out most of the remaining moisture, and carry it forward to the first and second series of press-rolls by means of an endless web of felt which passes round them, the speed of these rollers and the travelling sheet of felt, CC (figs 1 and 2), is nicely calculated, so as to prevent a strain upon the still very tender web of paper. Sometimes the upper rollers of these two series are filled with steam in order to commence drying the web. The paper is now trusted to itself, and passes on, as indicated by the arrows, from the second press-rolls to the first set of *drying cylinders*, DD (figs. 1 and 2), where it again meets with a felt sheet, which keeps it in close contact with the drying cylinders, which are of large size, and filled with steam. Around these it passes, drying as it goes, and is then received between the two *smoothing-rolls*, or damp calenders, which press both surfaces, and remove the marks of the wire and felt, which are until then visible on the paper. This necessarily is done before the drying is quite completed; and from the smoothing-rolls it passes to the second series of drying cylinders, E (figs. 1 and 2), where the drying is finished, and thence to the calenders, which are polished rollers of hard cast-iron, so adjusted as to give a considerable pressure to the paper, and

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produce a glossiness of surface. For writing-papers the paper passes through a shallow trough of size after leaving the drying cylinders, and then passes over another series of skeleton cylinders, with fans moving inside, by which it is again dried without heat, and afterwards passes through the calenders. Printing and other papers are usually sized by mixing the size in the pulp, in which stage the colouring materials—such as ultramarine for the blue tint of foolscap—are also introduced. Still following the paper web in the drawing (fig. 1), it is seen to pass from the calenders to another machine, F; this slits the web into widths, which are again cross-cut into sheets, the size of which is regulated at will. In the United States, for fine book-work, the paper receives a white coating after it has been made; it is the finish thus given to the surface that renders the illustrations seen in the best American magazines possible. The water-mark is impressed on machine-made paper by means of a fine light-wire cylinder with a wire-woven pattern; this is placed over the wire-gauze sheet upon which the pulp is spread, but near the other end of it, so that the light impression of the marker may act upon the paper just when it ceases to be pulp, and this remains all through its course. There are many other interesting points about the paper-machine, but their introduction here would rather tend to confuse the reader. Its productive power is very great; it moves at a rate of from 20 to 200 feet per minute, spreading pulp, couching, drying, and calendering as it goes, so that the stream of pulp flowing in at one end is in two minutes passing out finished paper at the

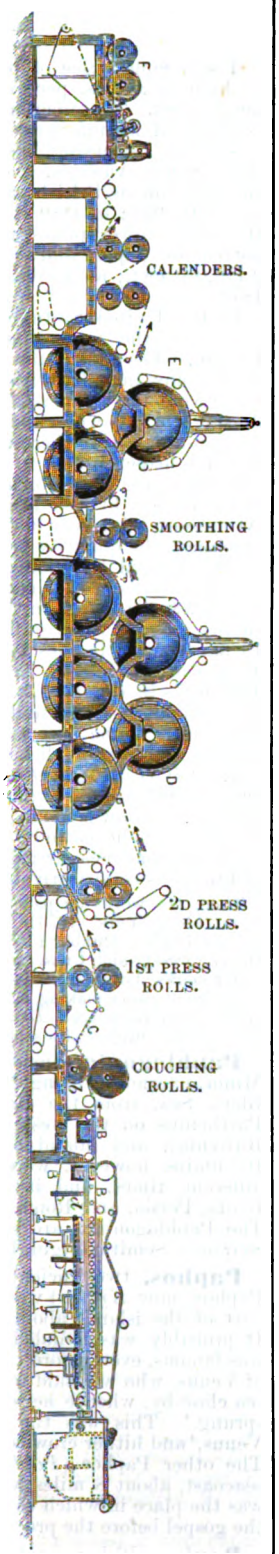

Fig. 1.

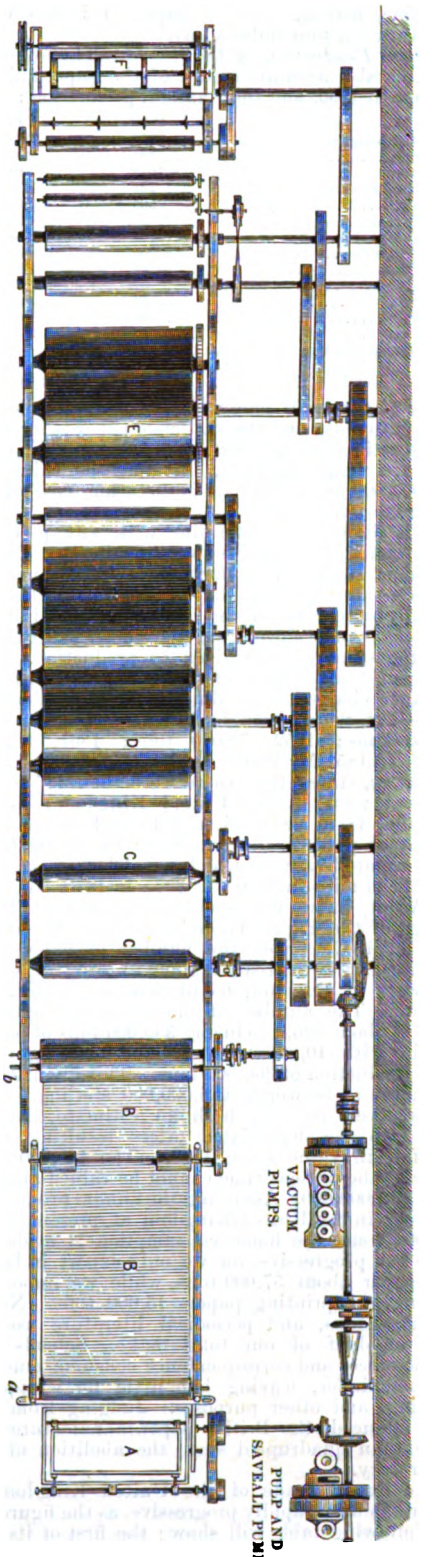

Fig. 2.

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other. It has been computed that an ordinary machine, making webs of paper 54 inches wide, will turn out four miles a day.

Paper Production of the World.—The following is a tolerably accurate return of the paper-mills of Europe in 1890, and their annual production:

	Mills.	Tons.
United Kingdom	300	400,000
France	491	240,000
Germany	1083	180,000
Austro-Hungary	741	72,000
Italy	230	48,000
Spain	95	13,000
Sweden and Norway	131	14,000
Netherlands	65	7,200
Russia	46	33,500
Belgium	37	22,500
Switzerland	34	10,000
Portugal	16	6,000
Denmark	13	8,600
Roumania and Greece	4	....
Total	3286	1,049,800

Many of the mills may not be working, some produce pulp only, and the vat-made paper is included in the estimate of production. Assuming 1 million tons are made annually, this may be valued at £30,000,000, of which half is the prime cost of the raw material.

It is difficult to determine with any precision the quantity of paper now made in the United Kingdom, as the manufacture is free from tax; but we may form a fair estimate by looking at the progress under the duty rate, and judging of the advance since from the increased exports and the stimulus now given to production. The following are official figures of the quantity of paper charged with duty before the abolition of the tax, which brought in £1,500,000. In 1842, 43,166 tons; 1852, 70,000 tons; 1861, 102,456 tons. In 1851 Mr Poole, in his *Statistics of British Commerce*, stated that there were then 437 paper-mills at work in the United Kingdom; 349 in England, 48 in Scotland, and 40 in Ireland. The weight of paper made amounted to 62,000 tons; the estimated value of which was £3,000,000. The number of mills in 1860 was 397; in 1870, 369. Mr W. Arnot, in his course of lectures on the 'Technology of the Paper Trade' before the Society of Arts in 1877, stated the number of paper-mills working in the United Kingdom at 385; of which 300 were in England, 65 in Scotland, and 20 in Ireland. The number of machines employed he gave at about 526, producing 350,000 tons of paper, which, with 10,000 tons of hand-made, gave a total production of 360,000 tons. This quantity he estimated to be worth £16,000,000 sterling. This is, however, far too high an estimate, having regard to the depreciated prices resulting from the fall in value since 1880. The 400,000 tons made at the present time cannot be valued at more than £12,000,000. Assuming the annual production of paper in the United Kingdom at present to be 400,000 tons, the home consumption is evidently large and progressive, for we only export in books and paper about 57,000 tons, while we import of writing and printing papers 15,000 tons. Newspapers, books, and periodical literature use up fully one-half of our total make. Schools and public offices and correspondence consume much of the remainder, leaving but little for wrapping, packing, and other purposes. Judging from the data adduced, the British paper-manufacture has more than quadrupled since the abolition of the paper-duty.

The export trade of the United Kingdom in paper has been rapidly progressive, as the figures in the following table will show; the first of its two columns comprising writing-paper, printing-paper, and envelopes; and the second all other kinds of paper.

	Cwt.	Cwt.
1870	130,650	88,465
1880	336,118	134,450
1889	712,246	216,590

The average price of paper, which in 1874 was as high as £3, 2s. per cwt., has fallen as low as 30s. per cwt. The superiority of the British over the continental manufacture has obtained for Britain a steadily increasing business in the markets of Asia, South America, and her Colonies. In 1879 the value of the British paper of all kinds exported was £915,925; in 1889 it was £1,602,075, even at the much lower prices ruling. In 1889 was imported of paper and pasteboard of all kinds 2,110,000 cwt., an increase of 1 million cwt. over 1882.

In the United States equal progress has been made in the paper-manufacture as in Great Britain. The first mill was established in 1690, on ground now included within Philadelphia. In 1770 there were forty paper-mills in Pennsylvania, New Jersey, and Delaware, and only three or four in New England. In 1840 there were in the United States but 426 paper-mills; in 1850, 443; and in 1860, 500, producing 60,000 tons; in 1872 there were 812 mills, owned by 705 firms, making 200,000 tons. At present, with over 1000 paper-mills having 3000 machines, the quantity made greatly exceeds that of the United Kingdom; the amount in some of the last years of the decade 1880–90 amounting to over 1,200,000 tons. In the other parts of America there are 85 paper-mills. In Asia there are 19 paper-mills, besides numerous vats; in Africa, 4; and in Australasia, 7; making a total of nearly 4500 mills in the world. The production of hand-made papers in China and Japan it is impossible to estimate. China has made great strides in her exports of paper of all kinds. From about 75,000 cwt. a few years ago the export advanced to 200,000 cwt. in 1887, valued at £304,000. The greater part of the paper now made in the world—at least three-fourths—is believed to be used for printing on, since the correspondence carried on in many countries out of Europe is comparatively small.

There are works on paper and paper-making by Hofmann (New York, 1873), Munsell (New York, 1876), Archer (1876), Dunbar (1881), Parkinson (1886), C. T. Davis (1886), and Cross and Bevan (1887). For old water-marks dating from 1473, see *Archæologia*, vol. xii. For ancient paper-making, see Hirth, *Chinesische Studien* (1890), and Karabacek, *Das Arabische Papier*. WALL-PAPER is the subject of a separate article.

Paphlagonia, anciently a province of Asia Minor, extending along the southern shores of the Black Sea, from the Halys on the east to the Parthenius on the west (which separates it from Bithynia), and inland on the south to Galatia. Its limits, however, were somewhat different at different times, and it successively belonged to Lydia, Persia, and Rome. Its capital was Sinope. The Paphlagonians are supposed to have been of Syrian or Semitic origin, like the Cappadocians.

Paphos, two ancient cities in Cyprus. Old Paphos (now *Kyklia*) was situated in the western part of the island, about 1¼ mile from the coast. It probably was founded by the Phœnicians, and was famous, even before Homer's time, for a temple of Venus, who was said to have here risen from the sea close by, whence her epithet *Aphrodite*, 'foam-sprung.' This was the home of the 'Paphian Venus,' and hither crowds of pilgrims used to come. The other Paphos (*Papho* or *Baffa*) was on the seacoast, about 8 miles west of the older city, and was the place in which the apostle Paul proclaimed the gospel before the proconsul Sergius.

Papias, Bishop at Hierapolis, in Phrygia, in the earlier half of the 2d century, is known to us only from references by Irenæus, Eusebius, and a

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few others, and from fragments of his lost work preserved in their writings (see especially Eusebius, *Historia Eccl.* iii. 39). Irenæus speaks of him as a 'hearer of John'—evidently meaning the apostle. Eusebius aptly quotes Papias himself against Irenæus on the point; but, while the quotation justifies his criticism thus far, it does not fully bear out his own view that Papias claimed to have been a hearer of two other disciples of the Lord, Aristion and the elder (not the apostle) John. There is, then, no very reliable evidence of personal intercourse with any of the immediate followers of Jesus. On the other hand, some of the links between Papias and the apostles are definitely known; for two daughters of the apostle Philip, living in Hierapolis, related traditions to him, and he was a 'companion of Polycarp' (69–155 A.D.), Bishop at Smyrna, who in his youth had been a disciple of the apostle John. The statement, however, in the *Chronicon Paschale*, that Papias suffered at Pergamum in the year of this contemporary's martyrdom at Smyrna, rests on the compiler's misreading of Eusebius (*Hist. Eccl.* iv. 15).

The only work which he is known to have written is the *Logiōn kyriakōn exegēsis* ('Exposition of Oracles of the Lord'), in five books, which on various grounds, including an expression in a fragment recently discovered, may be probably assigned to the period 140–150. It is now generally agreed that the signification of 'oracles' is not to be absolutely limited to 'discourses,' and that by 'Oracles of the Lord' we are to understand a record, or records, of the Lord's sayings, including at least a setting of narrative. Part of the author's design was to supplement his expositions with trustworthy oral traditions. But the scanty remains are enough to show that Papias was, as Eusebius says, 'of very small intellect,' credulous, and fond of recording the wonderful. His doctrinal characteristic is a quaint millenarianism, with traces of the *Apocalypse of Baruch*.

But it is in relation to the New Testament canon, and especially to what is known as the synoptic problem, that Papias is of real importance. The fragment bearing on Mark runs thus: 'This also the elder (John) said: "Mark, having become the interpreter (recorder) of Peter, wrote down accurately whatever he remembered, without, however, recording in order what was either said or done by Christ,"' &c. Many scholars maintain that the words suit the second gospel as we have it, while others who deny this accept them as an account of its groundwork. Still greater interest attaches to the short fragment on Matthew: 'Matthew, then, composed the oracles in the Hebrew (Aramaic) language, and each one interpreted them as he could.' This statement has often been called in question, but the best authorities now hold that Papias is correct as to the Aramaic original, and that the canonical gospel, while evidently not a translation, is a Greek edition, by either Matthew himself or some writer unknown. On the whole, the two-document hypothesis of the origin of the synoptics, which at present holds the field, coincides remarkably with the above two fragments (see GOSPELS). As to the rest of the canon, Papias quoted 1 John and 1 Peter, and was cited as an authority for the 'credibility' of the Apocalypse. There are also some indications that he knew the fourth gospel.

For Papias generally, see Lightfoot, *Essays on the Work entitled 'Supernatural Religion'* (1889); for the collected fragments, the *Patrum Apost. Opera* of Gebhardt, Harnack, and Zahn; for an English translation, the *Ante-Nicene Library*, vol. i.

Papier-mâché (Fr., 'mashed or pulp paper'). This name is applied to a material consisting either of paper-pulp or of sheets of paper pasted together, which by a peculiar treatment resembles varnished or lacquered wood in one class of articles made of it, and in another class (chiefly architectural ornaments) somewhat resembles plaster. Other substances are, however, mixed with paper, especially for the latter class of objects. Among eastern nations, where varnished and decorated articles in papier-mâché have long been made, the finest work has been produced in Persia, and next to it in Cashmere. The articles chiefly made are cases for pens and other writing materials, as well as boxes and trays. In Japan various objects are manufactured by glueing together a number of sheets of the soft and flexible paper of that country upon moulds, when it is in a damp state. This kind of papier-mâché, which is light, strong, and elastic, was at one time used in that country for helmets and other parts of armour. No doubt it was from one or other of these eastern countries that the art of working in papier-mâché was acquired by Europeans.

Articles of papier-mâché were extensively made in France in the first half of the 18th century. Subsequently the manufacture was largely developed in Germany. The painted papier-mâché snuff-boxes and other articles termed Vernis Martin work, from the fact that they were made by a coach-painter named Martin, who had a peculiar way of varnishing them, were in the 18th century popular throughout Europe, and fine specimens are still sought after by collectors. Papier-mâché appears to have been introduced into England for the purpose of imitating Japanese trays of lacquered wood. In 1772 Henry Clay of Birmingham took out a patent for making papier-mâché of sheets of specially prepared paper pasted together upon a mould. In this way he produced panels for doors and walls, besides cabinets, screens, tables, tea-trays, &c., and these are still manufactured. The best papier-mâché is made by Clay's method; but it is also made from paper-pulp to which glue has been added, and this is pressed between dies to give it the required shape. There is a third kind made of coarse fibrous material, mixed with earthy matters and a binding size, certain chemicals being added to render it incombustible. Suppose that a tray-blank of pasted sheets has been formed upon a metal mould. It is then heated to 120° F., and afterwards dipped in a mixture of linseed-oil and spirits of tar (other mixtures are used) to harden it and make it resist moisture. It is again placed in a stove, and when taken out it is planed and filed to give it the required finish. The tray now gets several coats of tar varnish and lampblack, each of which is rubbed down with pumice, and stoved once more. It is then ready to be decorated, after which it receives a coat of transparent varnish, and is finally polished with the hand.

Carton-pierre, which has been extensively employed for the internal decoration of buildings (much in the same way as plaster), is formed of paper-pulp mixed with whiting and glue, and pressed into plaster moulds. It is next backed with paper, allowed to set, and dried in a hot room. *Ceramic Papier-mâché* (Martin's patent dated March 15, 1858) is a very plastic substance, which can be readily moulded or otherwise worked into any required form. It is composed of paper-pulp, resin, glue, drying oil, and sugar of lead, well kneaded together.

There are various ways of decorating papier-mâché. For tea-trays, caskets, panels, and other objects with a black varnished surface, what is called 'inlaying' with plates of mother-of-pearl shell, scarcely thicker than stout writing-paper, has been largely practised. The pieces of shell are stuck on with varnish, and the design painted on them with a protecting varnish. An application

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of acid dissolves away the unprotected parts, and then the interspaces are filled up with varnish. When the surface is rubbed with pumice-stone the superfluous varnish is removed, and the shell ornaments displayed. In a similar way the surface can be 'inlaid' with cut-out metal devices. Flower and landscape painting has also been much employed in the way of decoration, as well as borders and other ornaments in leaf gold. Owing to the extensive importation in recent years of cheap Japanese lacquer wares (see LACQUER), the Birmingham manufacturers of papier-mâché have now largely resorted to an inexpensive decoration by transfer-printing, which can be done by boys and girls instead of highly-paid artists. A change has also taken place in the nature of the material itself, which has recently been chiefly made of wood-pulp from Sweden. A limited quantity of the old high-class papier-mâché is, however, still regularly manufactured. The variety of papier-mâché adopted for architectural ornaments, which are usually more or less in relief, can be readily painted, gilded, or bronzed. The application of papier-mâché to articles requiring great strength, such as wheels for railway carriages, has not proved so successful as was at one time anticipated.

Papilionaceæ (from Lat. *papilio*, 'butterfly'), a sub-order of the natural order of plants generally called Leguminosæ (q.v.), the plants of which have flowers of the peculiar structure called *papilionaceous*, and of which the Pea and Bean afford familiar examples. Papilionaceous flowers have five petals, imbricated in estivation (bud), one of which, called the *vexillum*, or *standard*, is superior, turned next to the axis, and in estivation folded over the rest; two, called the *alæ*, or *wings*, are lateral; and two are inferior, which are often united by their lower margins, forming the *carina*, or *keel*. The number of the Papilionaceæ is very great—about 4800 species being known. They are found in all parts of the world, abounding in the tropics. Many have superb and beautiful flowers; many are plants of beautiful form and foliage, trees, shrubs, or herbaceous plants; many possess valuable medicinal properties; and many are of great importance as furnishing food for man and for domestic animals, others as furnishing dyes, fibre, timber, &c. See BROOM, LABURNUM, CLOVER, BEAN, PEA, LUCERNE, LIQUORICE, INDIGO, SANDALWOOD, &c.

Papillæ. See SKIN, TASTE.

Papin, DENIS, a French physicist, was born at Blois, 22d August 1647, and studied medicine in Angers, where he practised for some time as a physician. But, becoming acquainted with Huygens, he helped him in his experiments with the air-pump; then, crossing to England, he assisted Boyle in his physical experiments, invented the condensing pump and the steam digester (1681)—a sort of steam cooking apparatus, to which was applied for the first time a safety-valve—and was made a member of the Royal Society (1680). Shortly afterwards he proceeded to Venice for the purpose of helping to conduct a newly-founded academy of science, but was back in London in 1684. Three years later he was appointed professor of Mathematics at Marburg, but from 1696 to 1707 worked in Cassel. Then, returning to England, he died in obscurity, probably in 1712. To Papin belongs the honour of having first applied steam (1690) to produce motion by raising a piston, and with this he combined the simplest means of producing a vacuum beneath the raised piston—viz. by condensation of aqueous vapour. In virtue of this his biographer claims that he is really the inventor of the steam-engine. He is the inventor of the safety-valve, an essential part of his digester; and he discovered the principle of action of the siphon.

His papers were mostly printed in the *Philosophical Transactions*, *Acta Eruditorum*, *Journal des Savans*, &c. He also wrote *Nouvelles Expériences du Vuide* (Paris, 1674). See Lives by Ernouf (Paris, 1874) and Gerland (Berlin, 1881). His correspondence with Huygens and Leibnitz was published by Gerland (Berlin, 1881). See *Nature*, vol. xxiv. (1881).

Papineau, LOUIS JOSEPH, Canadian statesman, was born at Montreal in October 1789. At twenty he was elected to the Legislative Assembly, and speedily worked his way to the head of the Radical or French-Canadian party, and in 1815 was chosen speaker of the House of Assembly for Lower Canada, a post that he held until 1837. He opposed the union of Upper and Lower Canada, formulated the grievances and demands of his party in the Ninety-two Resolutions, and agitated actively against the imperial government. When the province rose in rebellion in 1837, a warrant was issued against Papineau for high-treason, though he took no active part in the fighting. He escaped to Paris; but returned to Canada, pardoned, in 1847. He died at Montebello, in Quebec, on 23d September 1871.

Papinianus, ÆMILIUS, down to the time of Justinian the most celebrated of the Roman jurists, lived at Rome during the reign of Septimius Severus, whose second wife is said to have been his relative. Both he and Septimius were pupils of Scævola; Papinianus succeeded the prince as *advocatus fisci*, and afterwards held the office of *præfectus prætorio*. The son and successor of Severus, Caracalla, caused Papinianus to be put to death in 212. His works consist of 37 books of *Quæstiones*, 19 of *Responsa*, 2 of *Definitiones*, and *De Adulteriis*; from these works 595 excerpts were incorporated in Justinian's *Pandects*.

Pappenheim, GOTTFRIED HEINRICH, COUNT VON, an imperial general of great note in the Thirty Years' War, was born at Pappenheim, in Middle Franconia, Bavaria, 29th May 1594, of a very ancient Swabian family, in which the dignity of Marshal of the Empire became hereditary about the 13th or 14th century, and many of whose members had greatly distinguished themselves in the wars of the middle ages. At twenty he went over to the Roman Catholic Church, and thenceforth signalised himself by his fiery zeal in its cause. After serving under the king of Poland in his wars with the Russians and Turks Pappenheim joined the army of the Catholic League, and in the battle of Prague (1620) stayed the flight of the Austrian cavalry, and by a well-timed and furious charge turned the tide of battle against the Bohemians. In 1623 he received from the emperor the command of a cavalry regiment of the famous 'Pappenheimer Dragoons.' In 1625 he became general of the Spanish horse in Lombardy; but in 1626 he re-entered the Austrian service, and after suppressing a dangerous revolt of the peasants of Upper Austria, in which 40,000 of the peasants perished, he joined the army which was opposed to the Protestant League, and, in association with Tilly, carried on many campaigns against the Danes, Swedes, and Saxons. It was Pappenheim who induced Tilly to attack Magdeburg (q.v.), and on his head rests in great measure the guilt of the ferocious massacre. His reckless bravery involved Tilly against his will in the disastrous battle of Breitenfeld; but to some extent he retrieved his character by his heroic efforts to remedy the loss and protect the retreat of the army. After Tilly's death he served under Wallenstein, who detached him with eight regiments to protect Cologne, but, on hearing of the advance of Gustavus, sent an urgent order for his

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return. Pappenheim arrived at Lützen at the moment when Wallenstein's army was on the point of being completely routed, and at the head of his cuirassiers he charged the left wing of the Swedes with such fury as to throw it into confusion, and for a moment change the fortune of the battle. He was mortally wounded in the last charge, and died a few hours afterwards at Leipzig, November 7, 1632, with a smile on his countenance, after learning that Gustavus Adolphus was dead. 'God be praised!' he said: 'I can go in peace, now that that mortal enemy of the Catholic faith has had to die before me.'

Pappus. See COMPOSITÆ.

Pappus OF ALEXANDRIA flourished about the end of either the 3d or the 4th century A.D. Which of these dates is the more probable it is difficult to determine, owing to conflicting evidence, but recent opinion inclines to the former. Suidas states that Pappus was a contemporary of Theon, thus placing him towards the end of the 4th century, and ascribes several treatises to him. These treatises have not survived, and the only work by which Pappus is now known, his *Mathematical Collection*, receives no mention from Suidas. This work consisted of eight books, the first and the earlier part of the second of which are lost, and its interest is mainly, though not exclusively, historical. From what remains of the second book, it is conjectured that the first two books were arithmetical. The third book explains some of the methods for the duplication of the cube, treats of the progressions and the five regular polyhedra. The fourth book discusses the figure called the *arbelos* ('a shoemaker's knife'), the spiral of Archimedes, the conchoid of Nicomedes, and the quadratrix of Dinostratus. The fifth book contains some theorems regarding isoperimetrical figures plane and solid, and a short account of the semi-regular solids of Archimedes. The sixth book comments on some of the works of Theodosius, Aristarchus of Samos, and Euclid. From the seventh book, which is the longest and most valuable of the *Collection*, is derived a large part of our knowledge of Greek geometry. Many of the writings here analysed are no longer extant, and it is on the indications (in the notable instance of Euclid's *Porisms*, the very obscure indications) which Pappus gives of the object or the contents of them that the geometers of the 17th and 18th centuries relied for their restorations of these writings. The eighth book is devoted mainly to mechanics. The mathematical interest of the *Collection* does not equal the historical, but several of the books contain important theorems, the discovery of which is probably due to Pappus himself. One of these has been long associated with the name of Guldinus (1577–1643). Some others have received a brilliant development from the mathematicians of modern times. The last six books of the *Mathematical Collection* were translated into Latin by Commandinus, an Italian geometer, and were published in 1588; another edition appeared in 1660. Fragments of the Greek text have been printed at various times in England, France, and Germany, but the only complete edition is that of Fridericus Hultsch, *Pappi Alexandrini Collectionis quæ supersunt* (3 vols. Berlin, 1876–78).

Papua. See NEW GUINEA.

Papules, or PIMPLES, are 'solid small elevations of the skin,' and may be either pale in colour or inflammatory and more or less red. Papules occur as an early stage in the development of the eruption in many skin diseases—e.g. in eczema, where they speedily become vesicles; or in acne, where they become pustules. The papular diseases proper, where the eruption in its fully developed form consists of papules, are lichen and prurigo.

Papy'rus, a genus of plants of the natural order Cyperaceæ, of which there are several species, the most important being the Egyptian Papyrus or *Papyrus* of the ancients (*P. antiquorum*, *Cyperus papyrus* of Linnæus)—a kind of sedge, 8 to 10 feet high, with a very strong, woody, aromatic, creeping root, long, sharp-keeled leaves, and naked, leafless, triangular, soft, and cellular stems, as thick as a man's arm at the lower part, and at their upper extremity bearing a compound umbel of extremely numerous drooping spikelets, with a general involucre of eight long filiform leaves, each spikelet containing six to thirteen florets. By the ancient Egyptians it was called *papu*, from which the Greek *papyrus* is derived, although it was also called by them *byblos* and *deltos*. The Hebrews called it *gomé*, a word resembling the

Papyrus.

Coptic *gom*, or 'volume;' its modern Arabic name is *berdi*. The plant is nearly extinct in Lower Egypt, but is found in Nubia (whence it was probably introduced into Egypt) and Abyssinia. It still grows in the Jordan Valley, in the neighbourhood of Jaffa, and also of Sidon, in parts of the Sinai Desert, and in Sicily. It is often a conspicuous feature in African vegetation. It is represented on the oldest Egyptian monuments, and as reaching the height of about ten feet. It was grown in pools of still water, growing ten feet above the water, and two beneath it, and restricted to the districts of Sais and Sebennytus. The papyrus (not merely *P. papyrus*, but *P. dives*, which is still found in Egypt) was used for many purposes, both ornamental and useful, such as wreaths for the head, sandals, boxes, boats, and cordage, but the *P. papyrus* was valued principally for a kind of paper called by its name. Its pith was boiled and eaten, and its root dried for fuel. The papyrus or Paper (q.v.) of the Egyptians, made of strips of its pith in layers, was of the greatest reputation in antiquity, and it appears on the earliest monuments in the shape of long rectangular sheets, which were rolled up at one

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end, and on which the scribe wrote with a reed called *kash*, with red or black ink made of an animal carbon. When newly prepared it was white or brownish white and lissom; but in the process of time those papyri which have reached the present day have become of a light or dark brown colour, and exceedingly brittle, breaking at the touch. Papyrus was commonly used in Egypt for the purposes of writing, and was, in fact, the paper of the period; but, although mentioned by early Greek authors, it does not appear to have come into general use among the Greeks till after the time of Alexander the Great, when it was extensively exported from the Egyptian ports under the Ptolemies. It was, however, always an expensive article to the Greeks. Among the Romans it does not appear to have been in use at an early period, although the Sibylline books are said to have been written on it. It was cultivated in Calabria, Apulia, and the marshes of the Tiber, but the staple was no doubt imported from Alexandria. So extensive was the Alexandrian manufactory that Hadrian, in his visit to that city, was struck by its extent. It continued to be employed in the eastern and western empire till the 12th century, and was used amongst the Arabs in the 8th; but after that period it was quite superseded by parchment or by paper made of rags. During the later periods it was no longer employed in the shape of rolls, but cut up into square pages, and bound like modern books.

The discovery in Egypt of classical Greek authors written on papyrus began about the middle of the 19th century, and the results have been on the whole beyond expectation. The great orator Hyperides (q.v.), then only known by name, is now represented by four or five pretty complete orations; fragments of Euripides and Alcman have been added to what we possess of these authors, and early MSS. have been obtained of parts of Homer, Plato, Thucydides, Demosthenes, and Isocrates. In 1888–89 Mr Flinders Petrie found near Medinet el Fayûm papyri which were identified as fragments of Plato's *Phædo*, transcribed about 250 B.C., and a part of the lost *Antiope* of Euripides, besides quantities of letters and documents of the Ptolemaic period. In January 1891 more than 160 ancient mummies (dating from the 20th and 21st Dynasties) were found in a subterranean passage at Deïr el Bahari, near Thebes; with these were many papyri, containing, as usual, many ritual passages and extracts from the Book of the Dead (q.v.); there were also 'boxes crammed with papyri.' And at the beginning of the same year the world was surprised by the announcement that papyrus rolls obtained from Egypt by the British Museum authorities had been found to contain almost the whole of a lost but famous work of Aristotle on the constitution of Athens. Of these rolls there were four, of which the longest measures seven feet, the shortest three feet. They have been written by four different copyists, are mainly in a small semi-cursive hand, and date from about the end of the 1st century A.D. There are thirty-six columns in all, of which the last six are badly mutilated. The text was edited and published in February 1891 by Mr F. G. Kenyon; a later edition was that of Mr J. E. Sandys.

See Paoli, *Del Papiro* (1878); also the articles BOOK (and works there quoted), EGYPT, PALÆOGRAPHY, PAPER.

Par. See SALMON.

Pará, the name which the river Tocantins (q.v.) receives in its lower course, from Cametá downwards (138 miles). It is 20 miles broad opposite the city of Pará, and 40 miles broad at its mouth. The Paranan, an arm of the Amazon, which cuts off Marajó Island from the mainland, pours into it part of the waters of the great river.

Pará (official name *Belém*), a thriving city and seaport of Brazil, capital of the state of the same name, stands on the east bank of the river Pará, 70 miles from its mouth, on a point of land formed by the entrance of the Guandú. The harbour is nearly landlocked by wooded islands, and admits vessels of large size. Pará, as a whole, is a plain-looking commercial town, compactly built, and without straggling suburbs, the dense tropical forest coming close up to the outskirts. The streets are narrow, but regular, well shaded with mangoes and palms, and partly paved; many of the houses, with their blue and white tiled roofs and whitewashed walls, are very pretty. Tram-cars and telephones are in general use, and there is a railway to Bragança (108 miles). The principal buildings are the theatre, the government building, custom-house, and cathedral (1720). The city contains a small fort and botanic gardens. The place is not unhealthy, though the wet season extends over nearly two-thirds of the year. Pará, the headquarters of the 'Amazonian Steamboat Company' and others, is the emporium of the Amazon river-trade, supplying the towns of the interior with foreign goods, and exporting india-rubber, cacao, Brazil nuts, the *pirarucú* fish, &c. The annual value of the exports exceeds £2,500,000. Pop. 40,000. See *Scribner's Monthly* (May 1879), and Vincent, *Around and About South America* (1890).—The *state*, bordering on Guiana and the Atlantic, and divided by the Amazon, has an area of 443,653 sq. m., and a pop. (1888) of 407,350. 'Para Grass' is a name given to piassava; see FIBROUS SUBSTANCES.

Pa'ra, a coin of copper, silver, or mixed metal, though most generally of copper, in use in Turkey and Egypt; it is the 40th part of a Piastre (q.v.), and varies much in value, owing to the debased condition of the Turkish coinage.

Parable (Gr. *parabolē*, 'a comparison') was originally the name given by the Greek rhetoricians to an illustration avowedly introduced as such. In Hellenistic and New Testament Greek it came to signify an independent fictitious narrative, employed for the illustration of a moral rule or principle. This kind of illustration is of eastern origin, and the greatest examples are to be found in the Old and New Testaments, particularly in the discourses of our Lord. The parable differs from the fable in the probability or verisimilitude of the story itself, and agrees with it in the essential requisites of simplicity and brevity. It is essentially a short allegory marked by probability of incident, and intended to convey one direct moral or spiritual truth. In the course of time the word parable came to lose its significance of figurative speech, and to mean speech generally.

There are works on the parables of our Lord by Archbishop Trench (1846), Calderwood (1880), A. B. Bruce (1882), Goebel (trans. 1883), and Dods (1883). See also the articles ALLEGORY, APOLOGUE, and FABLE.

Para'bola, the section of a cone by a plane which is parallel to a generating line. As a particular case, when the plane passes through the vertex of the cone, the parabola closes up into a straight line. A property of the parabola is that the distance of any point on the curve from a certain fixed point is equal to its distance from a certain fixed straight line. The fixed point is called the *focus* of the parabola, and the fixed line is called its *directrix*. In the figure, PAP′ represents a parabola of which S is the focus and BC is the directrix. The point A is called the *vertex* of the parabola. The line ASO is the *principal diameter* of the curve; and any line drawn through a point such as P parallel to AO is called a *diameter*.

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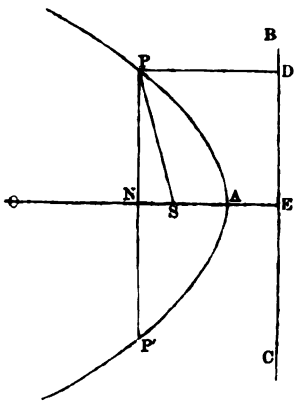
From the above property it is easy to prove that $PN^2 = 4AS \cdot AN$, where N is the foot of the perpendicular from P upon OA. It is obvious that the parabola is not a closed curve. The centre (corresponding to the centre of the ellipse) is situated at infinity. The tangent to the curve at P bisects the angle SPD. Hence a reflecting surface formed by the revolution of PAP' about OA as axis is such that parallel rays falling upon it in the direction of OS are reflected to S. Conversely, rays diverging from S will be reflected parallel to SO. Hence the intensity of the reflected beam of light remains constant at all distances from the source, except in so far as it is affected by absorption, and the parabolic is therefore the most perfect form of reflector (see LIGHTHOUSE, REFLECTION). If the resistance of the air were negligible, the path of a projectile would approximately be a parabola with its axis, or principal diameter, vertical, and its vertex at the highest point of the path. Let $PN = y$, $AN = x$, $AS = a$. The equation of the parabola referred to its vertex as origin is $y^2 = 4ax$. All curves the equations of which are of the form $y^n = px^m$ are classed as parabolas. Thus, the curve represented by the equation $y^3 = px$ is called the *cubical parabola;* and that one whose equation is $y^3 = px^2$ is called the *semi-cubical parabola.*



Paraboloid is a solid figure traced out by a Parabola (q.v.) revolving round its principal axis.

Paracelsus, a name coined for himself by Theophrastus Bombastus von Hohenheim, was apparently meant to imply that he was greater than Celsus; there is no good authority for further adding the names Philippus Aureolus. Paracelsus was the son of Wilhelm Bombast von Hohenheim, a physician at Einsiedeln, in the Swiss canton of Schwyz, and was born in 1490, 1491, or 1493 (it seems impossible to decide which). He owed his early education mainly to his father; went to Basel University at sixteen, but soon left to study alchemy and chemistry with Trithemius, Bishop of Würzburg; and next at the mines in Tyrol belonging to the Fugger family learned the physical properties of metals and minerals, and the disposition of rock strata, and began to realise that the observation of nature is of surpassingly greater value to the student than academic prelections or the lucubrations of the study. Here and in subsequent wanderings over great part of Europe he amassed a vast store of facts, learned the actual practice of medicine amongst various peoples, but lost all faith in scholastic disquisitions and disputations. He acquired no little fame as a medical practitioner, and on his return to Basel in 1526 received the appointment of town physician. He also lectured on medicine at the university, but defied academic tradition not merely by lecturing in German (not Latin), but by flouting at Galen and Avicenna—burning their books in public, it was affirmed—and denying all that was most firmly believed by the faculty.

Bitterness, backbiting, enmities soon rose and pursued him throughout the rest of his life, aggravated and justified in some measure by his own vanity, arrogance, and aggressiveness, as also by his intemperate habits. A dispute with the magistrates in 1528 led to his leaving Basel in haste; he wandered for more than a dozen years, visiting Colmar, Nuremberg, Zurich, Augsburg, and many other towns, but seldom sojourning more than a few months, and at last settled in 1541 under the protection of the archbishop at Salzburg. But he died on the 24th September of the same year—murdered by his enemies, said his friends; in consequence of a drunken debauch, said his enemies.

He is said to have written some 364 works, of which only some 230 were printed; and of these the critics only admit from ten (Marx) to twenty-four (Häser) as genuine, the others being by his followers the 'Paracelsists.' They were mainly written in Swiss-German, the Latin versions being by other hands. About a dozen were translated into English. The earliest printed work was *Practica D. Theophrasti Paracelsi* (Augsburg, 1529). Collected German editions appeared at Basel in 1589–91 (11 vols. 4to) and again in 1603–5 (4 vols. folio; re-issued 1618), Latin editions in 1603–5 (11 vols. 4to) and 1658 (Geneva, 3 vols. folio).

His system was based on a cosmogonic view of the universe, the disturbances in the economy of the human microcosm corresponding to and being determined by the movements of the all-embracing macrocosm. Repudiating the current pseudo-Aristotelianism, Paracelsus turned sympathetically to Neoplatonism and the Cabbala; but it seems difficult not to admit in him an element of pure charlatanism, as well as of mysticism. Unquestionably, however, his method and his influence tended in the direction of the immediate observation of nature, the discarding of antiquated theories, the encouragement of independent research, experiment, and innovation. He is not to be blamed for clinging like his age to Alchemy (q.v.); he certainly made some new chemical compounds, and applied chemical knowledge to improve pharmacy and therapeutics, and, in an empirical fashion, to revolutionise hide-bound medical methods.

See monographs by M. B. Lessing (1839), Marx (1842), Mook (Würzburg, 1876); the article MEDICINE; and the *History of Medicine* by Häser. There is an English *Life of Paracelsus* by Fr. Hartmann (1886); Browning's famous poem on Paracelsus is well known.

Parachute (Fr. *chute*, 'a fall'), a machine for the purpose of retarding the velocity of descent of any body through the air, and employed by aëronauts as a means of descending from Balloons (q.v.). The original type was a gigantic umbrella, strongly made, and having the outer extremities of the rods, on which the canvas is stretched, firmly connected by ropes or stays to the lower part of the handle. It was recommended in 1783 at Lyons by Le Normand as a means of escape from a house on fire, but was first used in connection with ballooning by Blanchard in 1793. In 1887 Baldwin claimed to have descended from a height of one mile by means of a parachute in 3½ minutes.

Paraclete. See SPIRIT (HOLY), MONTANISM, ABELARD.

Paradise (Gr. *paradeisos*, 'a park,' 'a pleasure-ground;' originally an oriental, apparently Persian, word; cf. the Heb. *pardes*, and modern Persian, *firdaus*), the garden of Eden (q.v.), Heaven (q.v.). —See BIRD OF PARADISE for the bird so named.

Paradise-fish (*Macropodus viridi-auratus*), a Chinese species of Macropod often kept in aquaria for its beauty of form and colouring. In the male the colours increase in brilliancy at the pairing-season, and he swims around his wished-for mate, fluttering the long, delicate filaments of the ventral

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fins, or erecting those of the tail fin like a peacock's train in miniature.

Paradox (Gr. *para*, 'beside' or 'beyond,' and *doxa*, 'an opinion'), a term applied to whatever is contrary to the received belief; not necessarily an opinion contrary to truth. There have been bold and happy paradoxes whose fortune it has been to overthrow accredited errors, and in the course of time to become universally accepted as truths. For paradoxists who square the circle, and invent perpetual motion, see QUADRATURE OF THE CIRCLE, PERPETUAL MOTION; and De Morgan's *Budget of Paradoxes* (1872).

Paradoxides Beds (*Paradoxidian*), a term sometimes applied to the Harlech or Longmynd and Menevian rocks of Britain, which are characterised by the presence of trilobites belonging to the genus Paradoxides. See CAMBRIAN SYSTEM.

Paraffin (so called as being *parum affinis*—i.e. having little affinity—for an alkali) is a name given by Baron Reichenbach (q.v.) to a white transparent crystalline substance first obtained by him in 1830 from wood-tar. The honour of this discovery must be shared with Christison of Edinburgh, who independently and almost simultaneously obtained the same body in making a chemical examination of Rangoon petroleum, and which he named petroline. Dumas, a French chemist, obtained it also from coal-tar in 1835. But for twenty years after its discovery paraffin-wax remained a chemical curiosity only. It was not till 1850 that it began to be produced, by Mr James Young, in quantity sufficient to occupy the attention of manufacturers. Since then it has become of great importance commercially, and has for years been the principal material employed in the manufacture of candles in Great Britain and Germany, having for that purpose, to a large extent, superseded the use of beeswax, spermaceti, stearic acid, and tallow, besides being used in many other branches of the arts and manufactures, and in surgery.

The word paraffin, at first applied by Reichenbach to the solid body, is now used by chemists as a generic term for the series of saturated Hydrocarbons (q.v.), the higher members of which are paraffin-wax, lower members are liquid, and the lowest are gases; marsh-gas or firedamp being lowest of all. Paraffin-oil was the term first employed by Mr Young to denominate the mineral burning oils produced by him, and this name still applies in Britain to all the oils associated with the manufacture of paraffin. In these oils, however, the olefine series of non-saturated hydrocarbons is largely represented along with liquid paraffins. But Petroleum (q.v.) is the term in general use to designate the natural oils of America, Russia, and other countries, which are for the most part mixtures of these same two series of hydrocarbons. As the production of paraffin-wax and paraffin-oils has now become an industry of great importance to the world, it will be convenient to make some reference here to the history of its development, particularly in Scotland, which is now the seat of the industry. To a comparatively limited extent coal and shale or schist are made use of in Germany, in France, in Italy, and in Australia for the production of hydrocarbon oils.

In December 1847 Mr James Young received a letter from Dr (Sir Lyon) Playfair, calling his attention to a dark oily liquid found in a coal-mine at Alfreton in Derbyshire. On examining this oil Mr Young recognised the commercial importance of the products that could be obtained from it. He erected a refinery, and produced a light oil for burning, a heavy oil for lubricating, and paraffin-wax. This petroleum spring, at first producing about 300 gallons per day, had exhausted itself at the end of two years. Meanwhile, Mr Young, reflecting on the probable origin of the oil, and after a series of experiments, succeeded in distilling at a low heat an analogous oil from coal. This process became the subject of his celebrated patent obtained in 1850. Works were erected at Bathgate, in Scotland, in which neighbourhood a highly bituminous cannel coal was at that time being mined for gas-making. It was known as Torbanehill Mineral or Boghead Coal (q.v.). This mineral was employed by Mr Young, and it yielded under distillation about 120 gallons of crude oil per ton. In 1851, when the Bathgate oil-works were started, the price of this coal was 13s. 6d. per ton, and it gradually rose, till in 1862 it stood at 90s. per ton, when the supply ceased. Mr Young's patent, which covered the distillation of oil from coal at a low red heat, ran from 1850 to 1864. In 1859, however, Mr Robert Bell erected oil-works at Broxburn (q.v.), in which he distilled oil from shale. He was the first in Scotland to use this material, although Du Buisson had obtained a patent in France previous to 1850 for the distillation of schist or shale. Since 1862 this mineral has been, and now is, the only mineral employed in Scotland for oil-making. Soon after Mr Young obtained his patent in 1850 he granted licenses for its use in the United States of America, where oil for several years was distilled from cannel-coal; but public attention being thereby directed to the natural petroleums which have since been found in such abundance, the use of cannel-coal was discontinued. Mr Young was thus the pioneer not only of the paraffin-oil manufacture, but also of the petroleum industries of the world.

During the progress of the shale-oil industry in Scotland it has been frequently subject to serious vicissitudes of fortune, more than once being threatened with extinction. During one of those periods of depression about 1872 the Welsh coal-oil trade collapsed entirely. The Scotch industry was saved from a similar fate by the energy and inventive resource of some of the persons engaged in it. The history of the trade naturally falls into various periods, and during these periods articles of manufacture that were considered by-products, and regarded of little value, or for which there was no market, and products which for years were even unknown came to be of prime importance in the life of the trade. The first period was a brief one (1848–50), when Mr Young utilised the petroleum-spring at Alfreton for the production mainly of lubricating oil, used in mills as a substitute for sperm-oil. The second period extended over the duration of Young's patent (1850–64), when the burning oil had become of the greatest importance to the manufacturer. The third period (1864–72) witnessed the great development of the petroleum trade in America, during which the price of burning oil fell so low that about half of the works in Scotland were closed. The fourth period (1872–78) was a period of severe struggle for existence. The smaller and weaker works disappeared. The production became concentrated in fewer hands with larger outputs. Burning oil being now less remunerative, the utmost attention was paid to the recovery of all waste-products and to the development of the by-products; paraffin-wax and sulphate of ammonia then becoming of chief importance to the manufacturer. Fortunately also the inventive genius, principally of N. M. Henderson, of William Young, and George T. Beilby, and others stimulated by necessity, culminated in the production of new and economical processes whereby manufacturing costs were reduced, and the yield of the products that had now become of most value were much increased. The fifth period (1878–87) was

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in consequence a time of much prosperity, ending, however, in a partial collapse by reason of over-production in Scotland combined with ever-increasing imports of wax from America. The sixth period began with 1887. It may be described shortly as the period of combination, the Scotch and American producers having combined to restrict the supplies of paraffin-wax within limits which the markets of the world can absorb.

Geologically, the position of the shale in the east of Scotland is in the Lower Carboniferous series, but in the west of Scotland it is found in the ordinary coal-measures. There are some seven or eight different seams of shale, all varying in position and quality from each other; but the same shale also varies from its normal character in different districts, being thick and rich in one place, and thin and poor in another. The Broxburn seam of shale at its best is probably the richest and most profitable quality to work; but the Pumpherston seams of shale, though poor in oil, have now become of value, because they are rich in ammonia. The shale is procured in the same manner as in coal-mining.

The following summaries will indicate the material facts in the history of the trade in Scotland, and the direction and extent to which the improved processes have tended—viz. diminished yield of burning oils, increased yield of lubricating oils, paraffin-wax, and sulphate of ammonia, together with reduction of loss in process of manufacture.

SUMMARY NO. 1.

	End of 3d Period—1872.	End of 4th Period—1878.	1890.
Number of works and capital employed	51—£1,750,000	18—£1,400,000	13—£2,000,000
Output of shale	800,000	850,000	1,869,200 tons.
Crude oil produced	25,000,000	29,000,000	52,876,700 gallons.
Burning oils produced	11,250,000	11,400,000	21,690,000 "
Lubricating oils produced	2,500,000	5,000,000	9,000,000 "
Paraffin-wax produced	5,800	9,200	22,846 tons.
Sulphate of ammonia	2,350	4,750	18,483 "

SUMMARY NO. 2.

SHOWING PERCENTAGE OF PRODUCTS UNDER THE OLD AND NEW SYSTEMS OF WORKING.

	Naphtha.	Burning Oils.	Lubricating Oils.	Paraffin.	Loss in process.
Old System (1880) parts per 100	5	40	13	8	34
New System (1890) "	4	35	17	14	30

The first most notable improvement was the Henderson retort, patented by N. M. Henderson in 1873. With this retort the spent shale off which the oil had been distilled, and which still contained about 12 per cent. of carbon, was allowed to descend into the furnace beneath the retort to serve as fuel in the distillation of fresh charges of shale. This effected a great saving of coal and labour, and, on account of mild temperature produced with regularity, there was increased yield of products of better quality and more easily refined.

In 1882 Mr William Young and Mr George T. Beilby, combining the results of their experiments, patented a new retort. It is a combination of two retorts; in the upper one the ordinary oil-products are distilled off, after which the shale is allowed to fall into a firebrick retort below, where a higher heat is employed and in which it is exposed to a current of steam and air; this method gives a greatly increased yield of ammonia; and it is therefore a form of retort of the utmost value in the case of shales rich in nitrogenous and poor in bituminous products.

This was followed in 1883 by Mr Henderson's continuous distillation process, in which the crude oil passes by gravitation through three stills. During the progress of the oil through these stills the fractionation or separation of the crude oil into naphtha, burning oil, and heavy or lubricating oil containing paraffin takes place automatically. In addition to these three stills there are two or more coking stills into which alternately the residue of the crude oil flows and where the distillation is completed, the dry coke being removed from each at regular intervals. The advantages obtained from this process are saving in first cost of plant, saving of labour, time, and fuel; less cost of maintenance; the fractionation of the oil is more perfect and uniform, and the distillates purer, giving less loss in refining. Mr Henderson also, by a patented process, greatly simplified and cheapened the cost of the production of sulphate of ammonia. And his new methods of refrigeration and refinement of the crude paraffin scale increased the yield of wax and improved the quality of the lubricating oils.

In the distillation of bituminous minerals for the production of gas a bright-red heat is employed in order to obtain as much incondensable vapour or permanent gas as possible. The aim of the oil-manufacturer on the contrary is to minimise the production of incondensable gas, and to obtain the highest percentage possible of the liquid and solid hydrocarbons. He therefore reduces the distillation temperature to the lowest practicable point—viz. from 600° to 800° F.

Crude oil is composed of a very wide range of hydrocarbons, each varying in specific gravity and boiling-point and in the percentage of carbon present; but in the practical operations of the refiner the fractionation of the oil is confined within certain definite limits which have been found of most convenience commercially—viz. *Naphtha*, specific gravity, 680 to 750 (water = 1000); volatile at ordinary temperatures; the highest portions are used for carburetting air gas; the heavier portions are principally used as solvents. *Burning oils*—(*a*) for domestic use; specific gravity, 800 to 805; flash-point, Abel test, about 100° F. (*b*) Lighthouse oil, specific gravity, 810 to 815; flash-point, Abel test, about 150° F. (*c*) High Test oils, specific gravity, 830 to 840; flash-point, Abel test, about 240° F.; used in special lamps for lighting railway-carriages and in ships. *Lubricating oils:* These are made of various standard specific gravities—viz. 865, 875, 885, 890–5. They are used principally for mixing with animal and vegetable oils in the preparation of lubricants. *Paraffin-wax*, with melting-points varying from 80° to 130° F. The soft wax from 80° to 100° is employed instead of sulphur in the preparation of ordinary safety-matches, while the harder qualities are manufactured into candles.

The operations in the production and refinement of mineral-oil products stated briefly are: The shale when taken from the pits is broken into small pieces and put into the retorts. In the retort the first chemical process, destructive distillation, takes place. The various products of the oil-works do not exist as such in the shale; they are all created by its destructive distillation. The shale, according to quality, yields from 20 to 40

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gallons of crude oil per ton, and over 60 gallons of ammonia water. This water, now such a valuable product to the oil-manufacturer, was allowed for years to go to waste; but in 1864 was for the first time utilised by Mr Bell, who recovered ammonia from it in the form of sulphate.

The operations of the oil-refinery are: (1) distillation, (2) treatment with chemicals, (3) cooling and pressing the heavy oil containing paraffin so as to separate the solid hydrocarbons from the liquid. The oils are distilled several times and are fractionated into the various qualities required; and between each distillation the oil is treated with oil of vitriol and with caustic soda. After the finishing treatment with acid and soda some of the soda compounds are retained in solution by the oil; these have to be carefully removed by washing with water. The absence of acid and alkaline compounds, and thorough fractionation of the oil, are the great secrets in the refining of burning oils; and at some of the works in Scotland the best burning oils that can be obtained are now produced, and the safety of the Scotch oils can be relied upon. In lubricating oils the essential features are high viscosity, high flash-point, and low setting-point. The first two depend on proper fractionation; and the third is secured by careful refrigeration, so that the lowest forms of solid paraffin may be crystallised and separated from the oil.

The crude paraffin scale or wax is refined either by chemicals, by sweating, or by treatment with naphtha. The chemical treatment is seldom used, the greater portion being purified under the sweating process, which is simple and effective. The temperature of the sweating-chamber is raised from 2° to 3° above the setting-point of the paraffin required; the oil then drains off, carrying most of the other impurities with it. But the best qualities of refined paraffin require a treatment or two with shale naphtha. The paraffin is melted, and about 30 per cent. of spirit run in, and after careful stirring together the mixture is allowed to cool down; it is then pressed, when the naphtha runs out, taking the colouring matter with it. This pressed paraffin is again melted and steam blown through it, which carries off the remainder of the naphtha, and finally the melted paraffin is stirred with animal charcoal, settled, and then filtered through cloth and filter-paper, and run into pans to solidify into cakes of convenient size for the candle-maker.

Paraguay, an important river of South America, an affluent of the Paraná (q.v.), rises in the Brazilian state of Matto Grosso. The sources of the river are a number of deep lakes, and 8 miles from its source the stream already has considerable volume. Pursuing a south-west course, and after flowing through a level country covered with thick forests, the Paraguay is joined from the west by the Jauru in 16° 30 S. lat. It then continues to flow south through the Marsh of Xarayes, which, during the season when the stream rises, is an expansive waste of waters, stretching far on each side of the stream, and extending from north to south over about 200 miles. The river still pursues a generally southward course, forming from 20° to 22° S. the boundary line between Brazil and Bolivia, thence flowing south-south-west through the territories of Paraguay to its junction with the Paraná, a few miles above Corrientes. Its chief affluents are the Cuyabá, Tacuary, Mondego, and Apa on the left, and the Jauru, Pilcomayo, and Vermejo on the right. Except in the marshy districts, the country on both banks of the river is rich and fertile, and abounds in excellent timber. The entire length of the river is estimated at 1800 miles; it is navigable for steamers to the mouth of the Cuyabá. The waters of the Paraguay, which are quite free from obstructions, were declared open to all nations in 1852; and now Brazilian mail-steamers ply monthly between Rio de Janeiro and Cuyabá, on the river of the same name, and there are several lines of steamers between Buenos Ayres and Asuncion.

Paraguay, an inland republic of South America, divided into two distinct portions by the river so named. Eastern Paraguay, or Paraguay proper, is a well-defined territory, nearly in the shape of a parallelogram, extending from 22° to 27° 20′ S. lat. and 54° to 58° 40′ W. long., bounded on the N. by the rivers Apa and Estrella, on the E. by the mountain-chains of Amambay and Mbaracayú and by the river Paraná, and on the S. by this same river. It contains an area of about 99,000 sq. m., and is bordered by the Brazilian and Argentine republics. Western Paraguay, or the Chaco (see GRAN CHACO), is a quadrilateral, of which one side is formed by the river Paraguay between the mouth of the Pilcomayo and that of the Rio Negro. On the west the only definition of a boundary is a line of separation between the Chaco and Bolivia, which has never yet been geographically determined, but which is supposed to pass along the meridian 64° 30′ W. The total area of Paraguay is estimated at about 142,000 sq. m.—a territory considerably larger than Great Britain and Ireland. The population of Paraguay is composed of whites of Spanish descent, Indians, a few negroes, and a mixture of these several races, and in 1888 was estimated at 370,753, exclusive of the Indians in the Chaco. A mountain-chain called Sierra Amambay, running in the general direction of from north to south, and bifurcating to the east and west towards the southern extremity, under the name of Sierra Mbaracayú, divides the tributaries of the Paraná from those of the Paraguay, none of which are very considerable, although they are liable to frequent and destructive overflows. The northern portion of Paraguay is in general undulating, covered by low, gently-swelling ridges, separated by large grass plains, dotted with palms. There are mountains in the north-east and north-west corners. The southern portion is one of the most fertile districts of South America, consisting of hills and gentle slopes richly wooded, of wide savannahs, which afford excellent pasture-ground, and of rich alluvial plains, some of which, indeed, are marshy, or covered with shallow pools of water (only one lake, that of Ypoá, deserving special mention), but a large proportion are of extraordinary fertility and highly cultivated. The banks of the rivers Paraná and Paraguay are occasionally belted with forest; but in general the lowlands are destitute of trees. The climate, for the latitude, is temperate, the temperature occasionally rising to 100° in summer, but in winter being usually about 45°. In geological structure the southern part belongs generally to the Tertiary formation; but the north and east present greywacke rocks in some districts. The natural productions are very varied, although they do not include the precious metals or other minerals common in South America. Much valuable timber is found in the forests, and the wooded districts situated upon the rivers possess a ready means of transport. Among the trees are several species of dye-wood, several trees which yield valuable juices, as the india-rubber and its cognate trees, and an especially valuable shrub, the *Maté* (q.v.), or Paraguay Tea, which forms one of the chief articles of commerce, being in general use throughout great part of South America. The shrub or tree grows wild in the north-eastern districts, and the gathering of its leaves gives employment in the season to a large number of the

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native population. Native orange woods are common, and more than fifty million oranges are exported annually. Many trees also yield valuable gums. Wax and honey are collected in abundance, as is also cochineal, and the medicinal plants are very numerous. The chief cultivated crops are maize, rice, coffee, cocoa, indigo, manioc, tobacco, and sugar-cane.

The animal world is largely represented in Paraguay, and game, both large and small, is very abundant. Tapirs, jaguars, pumas, ant-eaters, wild-boars, peccaries, and deer of many descriptions are inhabitants of the forests and plains; birds are innumerable, and for beauty and variety of plumage are perhaps unsurpassed by any in the world; the rivers teem with fish, and their banks are the resort of alligators and coypus. Snakes are numerous, but very few of them are venomous. Some of the boas are exceedingly large, and there is a remarkable water-serpent which is said to sometimes attain a length of eight yards.

The commerce of the country greatly increased during the decade 1880–90, and several banks and other mercantile institutions have been established. In 1880 the total value of exports was £252,000, that of imports somewhat less; in 1889–90 their respective values were £597,903 and £344,037. In this latter year the total revenue was £824,935, and the expenditure somewhat in excess. The chief exports are yerba-maté, tobacco, hides, oranges, timber, bark for tanning, and lace; the imports, cotton goods, hardware, wine, grain, rice, linen, silk, petroleum, &c. Trade in the towns is almost wholly in the hands of Italians, French, and Germans. The principal native industries are tanning and the manufacture of pottery and bricks, laces, ponchos, soap, food-pastes, brandy, &c.

Until the war of 1865–70 Paraguay had no national debt, but the utter ruin into which it had then fallen compelled it to have recourse to foreign aid. Two loans were contracted in London in 1871–72, the nominal amount of which was three millions sterling, but only about one-half was placed. The republic defaulted in 1874, but at the end of 1885 a settlement was made with the bondholders whereby the loans were reduced to the sum of £850,000 bearing 2 per cent. interest at the commencement, and gradually increasing to 4 per cent.; and furthermore, 500 square leagues of public lands were ceded by the republic in payment of arrear interest. The service of the new debt has been regularly maintained. There are also obligations or *polizas* assigned as an indemnity to Brazilian and Argentine subjects for losses sustained by them during the war. The total external indebtedness amounts to £4,704,308. There is no internal debt. The military force consists of 500 men. The established religion is the Roman Catholic, the ecclesiastical head of which is the Bishop of Asuncion. Education is free and compulsory; but of the adult Paraguayans only one in five can read and write.

The history of Paraguay is highly interesting. It was discovered by Juan Diaz de Solis in 1515, and further explored by Diego Garcia in 1525, and by Sebastian Cabot in 1526; but the first colony was settled in 1535 by Pedro de Mendoza, who founded the city of Asuncion, and established Paraguay as a province of the viceroyalty of Peru. The warlike native tribe of the Guaranis, however, a people who possessed a certain degree of civilisation, and professed a dualistic religion, long successfully resisted the Spanish arms, and refused to receive either the religion or the social usages of the invaders. In the later half of the 16th century the Jesuit missionaries were sent to the aid of the first preachers of Christianity in Paraguay; but for a long time they were almost entirely unsuccessful, the effect of their preaching being in a great degree marred by the profligate and cruel conduct of the Spanish adventurers, who formed the staple of the early colonial population. In the 17th century the home government consented to place in the Jesuits' hands the entire administration, civil as well as religious, of the province, which, from its not possessing any of the precious metals, was of little value as a source of revenue; and, in order to guard the natives against the evil influences of the bad example of European Christians, gave to the Jesuits the right to exclude all other Europeans from the colony. From this time forward the progress of civilisation as well as of Christianity was rapid. On the expulsion of the Jesuits from Paraguay in 1768, the history of which is involved in much controversy, the province was again made subject to the Spanish viceroys. For a time the fruits of the older civilisation maintained themselves; but as the ancient organisation fell to the ground great part of the work of so many years was undone, and by degrees much of the old barbarism returned. In 1776 Paraguay was transferred to the newly-formed viceroyalty of Rio de La Plata; and in 1810 it joined with the other states in declaring its independence of the mother-kingdom of Spain, which, owing to its isolated position, it was the earliest of them all to establish completely. In 1814 Dr Francia (q.v.), originally a lawyer, and the secretary of the first revolutionary junta, was proclaimed dictator for three years; and in 1817 his term of the office was made perpetual. He continued to hold it till his death in 1840, when anarchy ensued for two years; but in 1842 a national congress elected Don Mariano R. Alonzo and Don Carlos Antonio Lopez, a nephew of the dictator, joint consuls of the republic. In 1844 a new constitution was proclaimed, and Don Carlos was elected sole president, with dictatorial power, which he exercised till his death in 1862, when he was succeeded by his son, Don Francisco Solano Lopez, whose name has become notorious in connection with the tragic struggle of 1865–70, in which the Paraguayans made a heroic but unavailing fight against the combined forces of Brazil, the Argentine Confederation, and Uruguay. The war was brought to a close by the defeat and death of Lopez at the battle of Aquidaban, March 1, 1870. The results of the war may be read in the returns of the population—(1857) 1,337,439; (1873) 221,079, including only 28,746 men and 106,254 women over fifteen years of age. The sexes are now, however, again nearly equally balanced. Paraguay has had its share of the general emigration of recent years from Europe to South America; and in every way the country has made considerable progress. In June 1870 a congress voted a new constitution, which was proclaimed on the 25th November. It is modelled on that of the Argentine Confederation, the legislative authority being vested in a congress of two houses, and the executive in a president, elected for four years.

Asuncion, the capital, has a population of 34,000, and is connected by a railway 92 miles in length with Villa Rica, the second important town of the republic. It is proposed to prolong this railway to Encarnacion on the river Paraná, a distance of 136 miles, at which point it will form a connection with the Argentine railway system.

See Histories of Paraguay by Demersay (Paris, 1865) and Washburn (Boston, 1870); Daire, *Letters from Paraguay* (1805); Robertson, *Francia's Reign of Terror* (1840); Du Graty, *La République du Paraguay* (Brussels, 1861); Burton, *Battlefields of Paraguay* (1869); Martinez, *El Paraguay* (Asuncion, 1885); Knight, *Cruise of the Falcon* (1887); Criado (trans. by Winsweiler), *La République du Paraguay* (Bordeaux, 1889); La Dardye,

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Le Paraguay (Paris, 1889); Vincent, *Around and About South America* (1890).

Paraguay Tea. See MATÉ.

Parahyba, capital of the Brazilian state of Parahyba, on the river of the same name, 10 miles from the sea. Its chief buildings are the cathedral and the government palace (formerly the Jesuit college). A large sugar-mill was erected in 1889. At the mouth of the river is a bar; but a railway (12 miles) was built in 1889 to the port of Cabedello, there terminating in a pier in deep water. The annual exports—sugar, cotton, and cotton-seed, chiefly to Great Britain—amount to about £200,000. Pop. 14,000.—The *state*, the eastern-most in the republic, has an area of 28,854 sq. m. and a pop. (1888) of 496,618.—There is a more important Parahyba River farther south, which enters the Atlantic, in the state of Rio de Janeiro, after a course of nearly 500 miles. It is navigable for 50 miles from its mouth.

Parallax is the apparent displacement of an object caused by a change of place in the observer. When an object at M is looked at from P it

Fig. 1.

appears in line with some object, S; but after the observer has moved to E, M has apparently moved to a position in line with S'; the amount of apparent motion is called *parallax*. The angle PME is called the 'angle of parallax,' or the 'parallactic angle,' and is the measure of the amount of parallax. To astronomers the determination of the parallax of the heavenly bodies is of the utmost importance, for two reasons—first, from the necessity of referring all observations to the earth's centre—i.e. so modifying them as to make it appear as if they had been actually made at the earth's centre; and secondly, because parallax is our only means of determining the magnitude and distance of the heavenly bodies. The *geocentric* or *daily* parallax—as the apparent displacement of a heavenly body, due to its being observed from a point on the surface of the earth instead of from its centre, is called—is determined as follows: Let

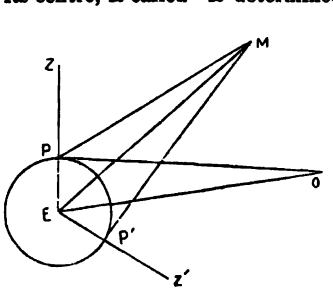


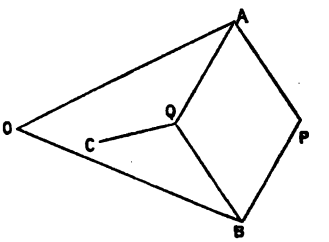
Fig. 2.

P and P' be two stations on the surface of the earth (fig. 2), E its centre, M the object to be observed, and Z and Z' the zeniths respectively of the observers at P and P' (points which, if possible, should be on the same meridian exactly); then at P and P' let the *zenith distances*, ZPM and Z'P'M, be observed simultaneously, and, since the latitudes of P and P', and consequently their difference of latitude, or the angle PEP', is known, from these three the angle PMP' (the sum of the parallaxes at P and P') is at once found; and then, by a trigonometrical process, the separate angles or parallaxes PME and P'ME. When the parallax of M, as observed from P, is known, its distance from E, the centre of the earth, can be at once found. When the heavenly body is on the horizon, as at O, its parallax is at a maximum, and is known as the *horizontal* parallax. The geocentric parallax is of use only in determining the distances of those heavenly bodies at which the earth's radius subtends a considerable angle.

In the case of the fixed stars, at which the earth's radius subtends an infinitesimal angle, it becomes necessary to make use of a much larger base-line than the earth's radius, and, as the largest we can employ is the radius of the earth's orbit, it accordingly is made use of, and the displacement of a star, when observed from a point in the earth's orbit instead of from its centre, the sun, is called the *annual* or *heliocentric* parallax. Here the base-line, instead of being, as in the former case, 4000 miles, is about 92,000,000 miles, and the two observations necessary to determine the parallactic angle are made from two points on opposite sides of the earth's orbit, at an interval as nearly as possible of half a year. Yet, notwithstanding the enormous length of the base-line, it bears so small a proportion to the distances of the stars that only in a few cases have they been found to exhibit any parallactic motion whatever, and very rarely does the angle of parallax amount to 1" (see STARS). The geocentric horizontal parallax of the moon is about 57' 4·2"; that of the sun, about 8·8"; and of the double star, 61 *Cygni*, the heliocentric parallax has been determined by Bessel to be ·348", equivalent to about 15 millionths of a second of geocentric horizontal parallax. See the articles STARS and SUN.

Parallel Forces are forces which act in parallel lines, such for example as the weights of the portions that make up any framework or structure on the earth's surface. With the exception of a particular case (see COUPLE), parallel forces have always a single resultant, which is readily found by the method of moments. See MOMENT; also FORCE.

Parallel Motion, a name given to any linkage by which circular motion may be changed into straight line motion. The most familiar instance is Watt's parallel motion (see STEAM-ENGINE), which is essentially a three-bar linkage, and, although not theoretically perfect, is sufficiently good for all practical purposes. It is impossible, indeed, to obtain a straight line motion without the use of at least *five* bars in the linkage; and till 1874, when Hart discovered the method, even this simplest mode of obtaining a true parallel motion was not deemed possible. The Peancellier cell, a linkage of seven bars, was, however, the earliest linkage discovered for solving the problem of how to draw a straight line. It dates from 1864, and is, perhaps, the most convenient form that has yet been devised. It is shown in the figure. The equal links AP, AQ, BP, BQ, form a rhombus; the long links OA, OB, are also equal, and have the common point O fixed. The seventh link, QC, has its end C fixed, so that Q describes a circle passing through O—i.e. QC equals the fixed distance CO. In these circumstances, when Q moves in its circle P moves in a straight line. See A. B. Kempe's *How to draw a Straight Line* ('Nature' series, 1877).



Parallelogram of Velocities. See COMPOSITION.

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Parallelopi'ped (Gr. *parallelepipedon*), a solid figure having six faces, the faces being invariably parallelograms, and any two opposite faces equal, similar, and parallel. If the faces are all squares, and consequently equal, the parallelopiped becomes a cube.

Parallels, in military language, are trenches cut in the ground before a fortress, roughly parallel to its defences, for the purpose of giving cover to the besiegers from the guns of the place. See SIEGE.

Paralysis. The term paralysis, while ordinarily used to express loss of power of movement, is used medically in the wider sense of loss of function, so that there may be paralysis of motion, of sensation, of secretion, &c. The term *Paresis* is used to indicate a diminished activity of function. Thus, paresis of a limb means diminished power of moving the limb.

From what is said under the articles BRAIN, NERVOUS SYSTEM, and SPINAL CORD it will be seen that paralysis may arise (1) from destruction of the nerve-cells in the motor area of the surface of the brain; (2) from interruption of the nerve-fibres in their path through the brain to the spinal cord; (3) from interruption of the nerve-fibres in their path through the spinal cord; (4) from disease of the nerve-cells in the spinal cord; (5) from disease or injury to the nerves passing from the spinal cord to the muscles; or (6) from affections of the muscles themselves. Thus, we speak of *Cerebral*, *Spinal*, and *Peripheral Paralyses.*

Cerebral Paralysis.—The most common causes of paralysis from brain disease are the rupture of blood-vessels (see APOPLEXY), or the blocking up of the blood-vessels which pass to the surface of the brain by clots or other solid particles carried from the heart or larger arteries (embolism). Other less frequent causes are tumours, abscesses, &c. The most usual form of paralysis is that termed Hemiplegia, in which there is paralysis of the leg, arm, and muscles of the mouth and tongue on one side of the body, often accompanied, if the disease is on the right side, by the condition called Aphasia (q.v.). If the original condition has been such as merely to produce pressure upon the nerves without their actual destruction, it may be completely recovered from. But this is obviously not very frequent. Hemiplegia may be entirely unaccompanied by any paralysis of sensation, but if the fibres which carry sensory impulses to the surface of the brain be also destroyed there will be a concomitant loss of sensation on the same side as the loss of motion (hemianæsthesia). In certain cases, when the disease of the brain is in the pons Varolii, the mouth may be paralysed on the opposite side from the paralysed limbs. (This depends on anatomical considerations.) Destruction by disease of individual 'motor areas' will obviously lead to paralysis of the corresponding movements.

Spinal Paralysis is usually the result either (1) of pressure upon the spinal cord from the results of curvature or injury of the spine, or of growths such as tumours or abscesses; (2) of disease of the spinal cord itself, especially from tumours or acute or chronic inflammations, which may lead to interruption of the nerve-fibres which pass downwards from the brain to the nerve-cells in the gray matter of the spinal cord; or (3) of direct injury to the spinal cord. If the conducting paths from and to the brain are interrupted in any way, there is complete paralysis of voluntary motion and of sensation below the level of the affected part of the spinal cord, because the motor impulses cannot pass down nor the sensory impulses upwards. At the same time, below the injury reflex movements may be preserved and certain forms even increased. Such spinal paralysis is termed Paraplegia. If the injury to the spinal cord is localised to one side there will be paralysis of the muscles on the same side, supplied by the nerves arising from the cord below the injury, and of sensibility of the opposite side of the body below the injury (see SPINAL CORD).

In certain cases the nerve-cells in the anterior horns of the gray matter of the cord (and the same may be said of the corresponding cells of origin of the motor nerves of the brain) may be diseased without implication of any other part of the spinal cord. The result of this is paralysis of the muscles supplied by those nerve-cells, and consequent gradual wasting of the muscles. Under this head come those frequent localised paralyses in the lower limbs of children (the so-called 'essential paralyses' of children) which affect certain groups of muscles, and lead to such deformities as club-foot and impaired growth of the limbs. A similar disease is sometimes observed in adults (progressive muscular atrophy), which runs a very chronic course and leads to a gradual wasting of muscles, the direct result of a corresponding gradual wasting of the nerve-cells in the gray matter of the cord. The disease called 'bulbar paralysis,' in which there is a slow affection of the muscles of the tongue, of the side of the mouth, and of the larynx, is of this nature, its more rapidly fatal termination being due to the implication of structures so necessary for organic life.

Peripheral Paralyses.—(*a*) *From Affections of Nerves.*—These are of extremely frequent occurrence, and may be due to pressure upon, injury to, or disease of the nerves. The most common of these diseases are the inflammations arising from cold, from the excessive use of alcohol, or from exposure to the poison of lead. If the nerve affected be a purely motor nerve the resulting paralysis is purely motor. The typical example is the so-called 'Bell's' or 'facial paralysis,' from affection of the seventh cranial nerve. This arises most commonly either from exposure to draught or from disease of the ear, in the neighbourhood of which the nerve passes through the bones of the skull (see EAR). There results a complete paralysis of the muscles of expression on the corresponding side of the face; the mouth is twisted to the opposite side, the lips cannot be pursed or retracted, the eye cannot be shut, and the forehead can be neither raised nor depressed, while the usual furrows on the forehead and cheek are either obliterated or diminished. The disease is in many cases amenable to treatment, but when associated with disease of the ear it should always be regarded as of grave import. If proper treatment be neglected, the paralysed muscles may waste, and recovery become impossible. 'Lead palsy' is usually indicated by a loss of the power of extending the wrists (wrist-drop) without impairment of sensation (see LEAD-POISONING). An example of paralysis resulting from pressure on a nerve is seen in the not uncommon result of sleeping with the arms over the back of a chair (sleeping or crutch palsy). As the musculo-spinal nerve is compressed, and the muscles which it supplies—namely, those which extend the wrist and fingers, and which turn the forearm outwards (supination)—are paralysed, there is a wrist-drop like that of lead palsy, but in addition there is loss of sensibility (anæsthesia) on the skin of the back of the thumb and first two fingers.

(*b*) *From Disease of Muscles.*—A very remarkable form of paralysis—affecting mostly the young—is that termed 'pseudo-hypertrophic paralysis,' in which the onset of the paralysis, which is very gradual, is accompanied by a remarkable apparent overgrowth of the muscles, more especially in the

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calves of the legs, in the thighs, and back. Examination of the muscles shows that the special muscular tissue is replaced by fat, while the nerves themselves are apparently not diseased. Injury, such as rupture or bruising of muscle, will produce paralysis, which may be only temporary.

Hysterical Paralysis.—Paralysis, which may for the time being be as complete as in any of the cases above described, may occur without any discoverable lesion. To this the term 'hysterical' has been applied (see HYSTERIA). The simulation of organic paralysis by hysteria is frequently so close as to deceive even expert observers. See Gowers, *Diseases of Spinal Cord and Brain;* Quain's *Dictionary of Medicine.* For 'general paralysis,' see INSANITY, Vol. VI. p. 155.

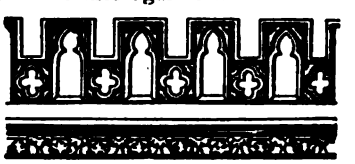
Paramar'ibo, the capital of Dutch Guiana, is situated on the Surinam, about 10 miles from its mouth. It has broad, tree-shaded streets, with clean wooden houses, painted light gray, and numerous canals and churches. There are also a governor's palace, two forts, a park, &c. The Herrnhuters (Moravian Brethren) are a strong body in the town. Except for the small harbour of Nickerie, all the trade of the colony is concentrated at Paramaribo. See statistics under GUIANA (DUTCH). Pop. (1884) 24,536.

Paramatta. See PARRAMATTA.

Paramecium, or SLIPPER ANIMALCULE, an Infusorian very common in pond water or in vegetable infusions. In shape it is an asymmetrical oval, in length about $\frac{1}{125}$ of an inch. If dry grass be steeped in a glass of water for some days, the animalcules dormant about the stems revive and multiply very rapidly. Each paramecium is covered with rows of cilia which lash it through the water and drive food-particles into an aperture which serves as mouth. As the food-particles enter they take bubbles of water with them, and are moved round and round in the living substance until they are digested or got rid off. There are two (excretory) contractile vacuoles; the large nucleus has a small one (paranucleus) lying beside it; beneath the thin rind there are remarkable eversible threads. A paramecium often divides transversely into two; these two repeat the process, and with continually diminishing size rapid multiplication may thus proceed for a while. It has its limits, however, and then two individual Infusorians conjugate, exchange some of the material of their paranuclei, and separate. Thus they seem to renew their youth.

Paraná, (1) an important river of South America, rises as the Rio Grande in the Brazilian state of Minas Geraes, about 100 miles NW. of Rio de Janeiro. It flows north-west and west through and along the southern frontier of Minas Geraes, till it unites with the Paranahyba. It then receives the name Paraná, and turns to the south-west and afterwards to the south, separating Paraná state from Matto Grosso and from Paraguay, round the southern border of which republic it sweeps westward to its confluence with the Paraguay River. It then rolls southward through the Argentine provinces, past Santa Fé, below which its channel frequently divides and encloses numerous islands, and finally south-eastward, till it unites with the Uruguay, above Buenos Ayres, to form the Rio de la Plata. The entire length of the river is a little over 2000 miles; it drains an area of more than 1,100,000 sq. m. Its chief tributaries, besides those already mentioned, are the Mogy Guassu, Tieté, Paranapanema, Ivahy, Iguassu, and Salado; at San Pedro (33° 40′ S. lat.) a delta begins. The principal towns on its banks are Corrientes, Paraná, Santa Fé, and Rosario—all Argentinian. The river is navigable at all times to the influx of the Paraguay (705 miles), and except at low water to the mouth of the Iguassu (460 miles). Immediately above this point occurs one of the most remarkable rapids in the world. It extends for 100 miles in a straight line up the river, between ranges of frowning cliffs which confine the stream to a narrow, rocky bed, little more than 100 yards wide. Through this gorge the water pours in tumultuous fury; for above the rapid the river, then 2½ miles broad, rushes down over the Salto of Guayra, an inclined plane 55 feet high, and then forces its waters, tossing and churning, into the narrow channel below.—(2) A southern state of Brazil, on the coast, with an area of 85,453 sq. m., and a pop. (1888) of 187,548, including several colonies of Germans and Italians. The capital is Curitiba (34,000), with a railway (69 miles) to Paranaguá, the port of the state (pop. 5000).—(3) Capital of the Argentinian province of Entre Rios, stands on a high bluff overlooking the Paraná, opposite Santa Fé, 410 miles by steamer from Buenos Ayres. The town was the capital of the Confederation from 1852 to 1861; afterwards it sank rapidly, but has now again a pop. of 15,000.

Parapet (Ital. *para-petto*, from *parare*, 'to protect,' and *petto*, 'the breast'), a wall raised higher than the gutter of a roof for protection; in military works, for defence against missiles from without (see FORTIFICATION); in domestic buildings, churches, &c., to prevent accident by falling from the roof. In classic architecture balustrades were used as parapets. In early work parapets are generally plain, but in later buildings they are pierced and ornamented with tracery.



Ornamented Gothic Parapet.

Paraphrase (Gr. *para*, 'beside,' and *phrazein*, 'to speak') is the name given to a verbal expansion of the meaning either of a whole book, or of a separate passage in it. A paraphrase consequently differs from Metaphrase, or strictly literal translation, in this, that it aims to make the sense of the text clearer by a lucid circumlocution, without actually passing into commentary. The versified passages of Scripture forming part of the Psalmody of the Scottish Church are known as 'the Paraphrases.' See HYMN, Vol. VI. p. 48.

Paraplegia. See PARALYSIS.

Parasite (Gr. from *para*, 'beside,' *sitos*, 'food;' one who eats with another; hence one who eats at the expense of another), a common character in the Greek comedies; a low fellow, who is ready to submit to any indignity that he may be permitted to partake of a banquet, and who lives as much as possible at the expense of others.

Parasitic Animals are those which live on or in other organisms, from which they derive their food. But this mode of life has many forms and degrees; the hosts may be animals or plants; the parasites may be external or internal (ectoparasitic or endoparasitic), fixed or with the power of movement; they may be parasitic temporarily, for a prolonged period, or for the whole life; restricted to one host, or requiring to pass from one kind of animal to another if the life-cycle is to be completed. For the parasitic animals which infest plants, see CORN INSECTS, GALLS, &c.; and ASCARIS, FLUKE, TAPEWORM, THREAD-WORMS, TRICHINA, &c., and other parasites are separately discussed.

Grades of Parasitism.—The grades recognised by Leuckart are: (1) *Temporary Parasitism.*—

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'To this category belong almost exclusively ecto-parasites, which differ from their free-living relations only in their diet.' (2) *Ectoparasitism*—an established and invariable habit during a prolonged period or during the whole of the parasite's life. This is called 'stationary' ectoparasitism in the translation of Leuckart's great work, but the term hardly suggests the idea. 'These parasites either pass through all their developmental stages on the host, or at first lead an independent existence under a form more or less different from that of the adult.' (3) *Endoparasitism*, in which the parasites are during a great part of their life, and almost invariably during their maturity, 'boarders' within the body of their host. Moreover, all the developmental stages are almost never passed through within one host, a transference from one kind to another being necessary for the completion of the life-cycle. But of endoparasitism there are many varieties.

The Hosts of Parasites.—Probably no animals, except some of the simplest, are free from the attacks of parasites. Yet some are more liable than others—e.g. because they offer greater inducements to those parasitically inclined, because they are more accessible, or because they eat infected food. Thus, vertebrates are more abundantly infested than invertebrates. 'Man has more than fifty distinct species of parasites, the dog and the ox some two dozen each, the frog perhaps twenty.' Some species of parasite are limited to one kind of host; thus, the adults of *Bothriocephalus latus* and *Oxyuris vermicularis* are not known except in man, while *Trichina spiralis* is found in man, pig, rat, dog, cat, ox, &c., and *Distomum hepaticum* in many ruminants and other ungulates, in rodents, in the kangaroo, and in man. The systems most infested are the most accessible—viz. the skin and the alimentary canal, by ecto- and endo-parasites respectively; but there are no organs in which parasites may not be harboured.

Origin of the Parasitic Habit.—It is probable that most cases of parasitism began gradually. Animals found temporary shelter on or in others, and the habit grew upon them. In some cases it might begin fortuitously—e.g. as the embryos or adults wandered or were swallowed; or it might be a shift saving those which adopted it from some presumed keenness in the struggle for existence; or it might simply express a sluggish constitution. In many cases, however, we can hardly doubt that the habit began with the naturally more sluggish females, prompted not by hunger, but by the impulse to seek some conveniently sheltered place for the birth of the young. In fact, there are not a few parasitic female Crustaceans whose mates live freely. Of the evolution of parasites from free-living ancestors the free stages still included in the life-history of most, the close relationships between some free and some parasitic members of the same class—e.g. Crustaceans and Nematodes—and the frequent occurrence of temporary parasitism afford sufficient evidence. It is also instructive to consider the three classes of Plathelminthes—Turbellarians (Planarians, &c.), Trematodes (Flukes, &c.), and Cestodes (Tapeworms, &c.)—of whose genetic relationship there seems little doubt; the Turbellarians are almost all free-living; the Trematodes are mostly external, but sometimes internal parasites; the Cestodes are all endoparasitic.

Life-history of Endoparasites.—Most endoparasitic animals have an eventful life-history. They are not always parasites, or they are not always parasites within the same kind of host. Most of them are at some time free; many of them have some sort of metamorphosis. But, as their life-histories are very various, they do not readily admit of being summed up in general statements.

Let us begin, however, with the adult sexual animals. In this state they are always almost parasitic, partly because rich copious diet, warmth, and relative quiescence favour reproductive maturity; partly because many probably began their parasitic career at the reproductive period, when shelter and readily attained food were specially advantageous; partly because it is not likely that animals which had become parasitic would relinquish this habit in adult and mature life. In fact, with the exception of some thread-worms (Gordius, Mermis, &c.) and some few insects (ichneumon-flies, gad-flies, &c.) which are parasitic in their youth and free as adults, it is generally true of parasitic animals that the eggs are produced, fertilised, and deposited in the parasitic stage. In regard to the reproduction it should be noted (1) that the fertility is often enormous, for a tapeworm may produce 42,000,000 eggs, and a female thread-worm 64,000,000 in a year; (2) that in those cases where the female alone is parasitic fertilisation may take place before parasitism has begun; that otherwise it occurs within the body of the host; that Trematodes and Cestodes are hermaphrodite and sometimes fertilise themselves; (3) that in tapeworms the fixed 'head' buds off a long chain of joints, each of which is sexually complete, becomes eventually distended with eggs and embryos, and is liberated singly or along with others from the intestine of the host.

The eggs or embryos of the parent endoparasite usually pass from the host along with the excreta, and 'there are no intestinal worms, at least among the typical and constant parasites, whose embryos come to maturity near the parent; or, in other words, there are none which pass their whole life-cycle in one locality.' Some of the embryos are locomotor—e.g. those of the liver-fluke and of *Bothriocephalus latus*, which are active migratory; others are passively carried along with food and drink into new hosts. There the embryos rarely become or remain quiescent, but wander from the food-canal through the tissues and organs of the host until a fit resting-place is found. But, to state another of Leuckart's general conclusions, 'the quiescent stage following upon the wandering embryonic stage does not conclude the life-history of the parasite, which requires, in order to complete its development, a radical change in its environment—in other words, a second migration.'

But before leaving the so-called intermediate host—which is different from that of the parent or that of the adult—we should notice that within it asexual multiplication may occur. Thus, several asexual generations characterise that part of a liver-fluke's life during which it sojourns in a water-snail (Limnæus) prior to reaching its final or 'definitive' host in the sheep. In other cases, the asexual multiplication within the intermediate host is of a simpler kind, being restricted to budding, as when the bladder-worm or proscolex of *Tænia echinococcus* within ox or man develops many 'heads' or scolices, each of which on being transferred to dog or wolf will grow into a tapeworm. Or there may be no true multiplication—e.g. in the numerous bladder-worms which form only one head, and remain quiescent until the host happens to be devoured by another, within which the 'head' of the bladder-worm may bud off an adult tapeworm chain.

Connected with this change of host there are two main problems: (1) How is the change effected? (2) how did this extension of the life-history to two distinct hosts arise? In regard to the modes of transference it will be enough to give two illustrations. The young liver-fluke actively migrates from a water-snail and from the water, encysts on stems of grass, and is then eaten by a sheep.

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PROTOZOA.			
Rhizopoda.	A few parasitic.	*Amœba coli* in man.	
Gregarinida.	All parasitic.	In all sorts of animals; *Coccidium oviforme* in man.	Usually intracellular parasites during part of life. A few occur within the blood-cells of birds, reptiles, &c.
Infusoria.	A few parasitic—e.g. Ichthyophthirus.	Outside fishes.	
	Opalina.	In gut of frog.	
	Balantidium coli.	In large intestine of man.	
SPONGES.	Probably none in strict sense.		Clione bores in oyster-shells, &c., and cases of commensalism are recorded.
Cœlenterata.	Very rare instances:		
	Medusoid *Cunina* (*Cunoctantha*) *parasitica*.	In another Medusoid, *Geryonia proboscidialis*.	A Medusa (*Mnestra*) on the neck of the pelagic Gasteropod Phyllirhoe, and the frequent occurrence of a sea-anemone on a hermit-crab illustrate commensalism.
	Cunina (*Cunoctantha*) *octonaria*.	In the bell of the Medusoid Turritopsis.	
	The Hydroid *Polypodium hydriforme* is in one stage parasitic.	On the ova of the sterlet (*Acipenser ruthenus*).	
'MESOZOA.'	All parasitic.	Orthonectida (Rhopalura), in a brittle-star (*Amphiura squamata*), in a Nemertean worm (*Lineus lacteus*), Dicyemidæ (Dicyema) in cuttle-fish.	These forms are perhaps very primitive, perhaps very degenerate, worm-types.
'WORMS.'			
Turbellaria (Planarians, &c.).	Mostly free-living; a few genera are parasitic:	Graffilla in marine molluscs.	
		Anoplodium in or on Holothurians.	
Trematoda (Flukes, &c.).	All parasitic, many externally, and usually on one host.	Especially on fishes.	'Monogenetic.'
	Many internally, and then requiring two hosts.	The first usually a mollusc, the second some vertebrate.	'Digenetic.'
Cestoda (Tapeworms, &c.).	All parasitic; the mature sexual forms in vertebrates, except in the case of Archigetes, which becomes mature in the freshwater worm Tubifex.	All sorts of vertebrates contain both stages, the adults in the gut, the immature forms usually in the flesh. But the immature stages have also been found in some molluscs, Arthropods, and worms.	Two hosts are requisite to complete the life-history of the parasite. The final host usually devours the intermediate one.
Nemerteans (Ribbon-worms).	Almost all free-living.	Two occur on crabs.	
	Malacobdella.	In bivalves.	
Nematoda (Thread-worms).	Many parasitic; many free. In man occur *Ascaris lumbricoides*, *Oxyuris vermicularis*, *Filaria sanguinis hominis*, *Filaria medinensis*, *Trichina spiralis*, &c.	The majority in the digestive tract of vertebrates; but they may be transferred from a lower host to a higher—e.g. from insect to mammal.	The life-histories are often very complex, and may include alternation of generations. Many infest plants.
Acanthocephala.	The class includes one genus (Echinorhynchus), and this is parasitic.	*Ech. proteus* lives as adult in pike, &c., in youth in the amphipod *Gammarus pulex*; *Ech. angustatus* of perch in the isopod Asellus. *Ech. gigas* occurs in the pig.	
Chætopoda (bristle-bearing worms).	Almost all free-living. Three or four marine forms are parasitic.	The minute males of Bonellia and Hamingia live within the females.	Branchiobdella, which some rank among Chætopods, is parasitic on fresh-water crayfish.
	Myzostomidæ are ectoparasitic and form galls.	On Crinoids.	This family probably represents Chætopods degenerated by parasitism.
Hirudinea (Leeches).	Most are ectoparasitic (the rest wandering carnivores).	On molluscs, fishes, amphibians, &c.	In many, however, the ectoparasitism is very temporary.
Rotifera.	Mostly free-living, a few parasitic—e.g. Seison.	On crustacean Nebalia.	
	Albertia.	In earthworm and slug.	
ECHINODERMATA.	None parasitic.		
ARTHROPODA.			
Crustaceans.	There are many parasites among		These illustrate (*a*) many grades of parasitism—temporary, periodic, thoroughly established, and (*b*) corresponding grades of degeneration.
	Copepoda—e.g. Chondracanthus. Caligus. Lernæa.	Usually on skin, gills, &c. of fishes.	
	Among Cirripedia—e.g. Sacculina.	Beneath the tail of crabs.	
	Among Isopods—e.g. Bopyrus and Entoniscus.	On fishes.	
Insects.	The vast majority are free-living, but ectoparasitism is illustrated by		
	Bird-lice (Mallophaga). Lice (Pediculidæ).	Mostly on birds and mammals.	
	Strepsiptera.	In bees and wasps.	The females only are parasitic, the males free.
	(Many are parasitic on plants.)		
	Endoparasitism by the larvæ of Ichneumon-flies.	In other insects.	
	Gad-flies.	In mammals, cattle, horses, &c.	
Arachnida.	The majority are free-living, but parasitism is illustrated by		
	Linguatulina (Pentastomum).	Embryo in rabbit; adult in frontal sinuses of dog and wolf.	With little trace in adult of Arachnid appearance.
	By some Acarina (mites).	*Demodex folliculorum*, Sarcoptes (itch-mite), in skin of man, &c.	
MOLLUSCA.	All free-living, except a few Gasteropods.		
	Entoconcha mirabilis.	Within Holothurian Synapta.	
	Eulima and Stylifer.	On or in various Echinoderms.	
VERTEBRATA.	The hagfishes (Myxinoidei) are the only parasitic vertebrates.	They are said to eat their way into cods and other fishes.	Precise details are wanting.

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Here, and in some other cases, the migration is in part active. On the other hand, the bladder-worm of the pig lies quite passive in the muscles or connective tissue of that animal, and cannot reach its final host unless 'measly' pork be eaten by man. Here, and in most other cases, the migration is passive. The second problem is very difficult. Is the host in which the adult is found the primitive host, and has that of the immature stages been intercalated? or is the intermediate host really the primitive one in which the animals used to become mature, while the final host represents a secondary prolongation of the life-history? Leuckart expresses himself unconditionally in favour of the second theory that 'the intermediate hosts were originally the true definitive carriers, which formerly brought their intestinal worms to sexual maturity, but have since become merely intermediate, because the development of the parasites has extended itself over a greater number of stages in the course of further differentiation.'

The Environment of Parasites.—It is at present debated (see HEREDITY) whether the precise influences exercised on parasites by their hosts are transmissible or not. But it can hardly be doubted that the habits and surroundings of parasites have been somehow influential in their evolution. It is certain that individual parasites may vary in different parts of the body and in different hosts, and it is admitted by all that parasites exhibit 'adaptations' to their life and surroundings. It is therefore important to take account of the precise relations between host and parasite. Ectoparasites will experience mechanical influences due to the movements of their bearers, they will often be carried from one locality to another, they will sometimes share in the warmth of their hosts, they usually find abundant food, and they are often not only sheltered but sedentary. Endoparasites will experience pressure from the tissues in which they lie, or from the peristaltic movements of the food-canal in which they are lodged; their immediate environment usually involves confined space, scant oxygen, considerable warmth, and total darkness; they will be affected by abundant and rich nutrition, by surrounding gases and juices, and by their frequently sedentary life. Now it is at least a plausible theory that the usual absence of sense-organs in endoparasites is due to the unstimulating character of the environment, which has caused them to degenerate, and this view is partly confirmed by the occasional occurrence of sense-organs in the larvæ alone, and by the facts that locomotor appendages are absent or much reduced in the adults of many fixed ectoparasitic crustaceans, because they have gone out of use; that a food-canal is absent in many endoparasites, partly because the superficial absorption of complex surrounding juices left it functionless; that the passivity of many is increased by living in surroundings in which the respiratory processes must be very sluggish; or that the prolific reproduction—especially perhaps the budding growth of tapeworms—is in part due to the abundant and yet stimulating nutrition.

Effects of Parasites on their Hosts.—In the 17th and 18th centuries the injurious effects of parasites were much exaggerated. All sorts of diseases, including many which we now know to be associated with Bacteria, were said to be due to 'worms,' and physicians gravely discussed '*An mors naturalis sit substantia verminosa?*' As accurate diagnosis began to be less unusual, a strange reaction in favour of parasites found many supporters. Intestinal worms were called 'the good angels and unfailing helpers of children,' and were said to aid digestion and even development. But since the middle of the 19th century, when the experimental study of parasites began in earnest, a knowledge of the various injuries which parasites may do, to man and to domesticated animals at least, has become more and more precise and complete. Only a few illustrations need be given. Numerous large parasites will certainly diminish the nutritive supplies of their host; large bladder-worms and the like press upon adjacent organs, cause obstructions, and give rise to many troubles; the movements and migrations of parasites within the body of their host produce pain and inflammation, and may even result in the perforation and destruction of important organs. Even external parasites may do considerable damage; witness those crustaceans which occur beneath the tails of crabs, and sometimes effect the virtual castration of their hosts. On the other hand, there are many less important parasites whose effects are very slightly if at all injurious. It is a question of much practical importance how the endoparasites which infest man find their way to their host, but as details will be given in such articles as TAPEWORM and TRICHINA, it is enough here to say that food in which parasites are known to lurk should be inspected, cleaned, and sufficiently cooked.

Historical.—Most of the ancient and mediæval naturalists and physicians who expressed any opinion on such matters believed that parasites were spontaneously generated within the bodies of their hosts. It was not till the 17th century, when Swammerdam and Redi showed how maggots, lice, &c. developed from eggs, that the belief in *generatio æquivoca* began to be seriously disputed. It was gradually replaced by the theory that parasites came from without, that, ceasing to be free-living, they entered the bodies of other animals and were there modified. But this conclusion was too hastily leaped at, and no care was taken to prove that the free-living forms in question did really develop into parasites. In many cases, indeed, it was soon shown that they did not, and this disappointing result helped Pallas and others in the latter part of the 18th century to recognise rightly that parasites were propagated like other animals by means of eggs. They concluded, however, that these eggs were more or less directly carried from one host to another, there to develop into the original form, while we know that the life-history of parasites is rarely so simple; nor was there more than a slight warrant for another favourite idea that young animals inherited parasites from their mothers. At the beginning of the 19th century the helminthologists, such as Rudolphi and Bremser, were very active and greatly extended the list of known parasites, but the life-histories remained a puzzle, and many naturalists relapsed into a belief in spontaneous generation. The increasing use of the microscope led to most important results: in 1831 Mehlis discovered the Infusorian-like embryo of certain flukes; Von Siebold (1832) detected the six-hooked embryo within the still unliberated ova of the tapeworm; Eschricht (1841) compared the life-history of internal parasites to that of ichneumon-flies and bot-flies; Steenstrup (1842) published his famous essay on alternation of generations; Von Siebold (1843–50) and Van Beneden (1849–50) worked out the metamorphoses of several parasitic worms; Küchenmeister (1853), Leuckart (1856), and others showed experimentally how infection with larval stages resulted in the development of adult parasites. The foundations of modern helminthology were thus laid, and we have now a vastly increased knowledge of the number of parasites, a precise acquaintance with the life-history and migrations of some of the most important, a scientific system of medical diagnosis and treatment, and some realisation of the general biology of parasitism.

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See ASCARIS, BOT, BOTHRIOCEPHALUS, COMMENSALISM, CORN INSECTS, DEGENERATION, ENVIRONMENT, FISH-LOUSE, FLUKE, GALLS, GREGARINIDA, GUINEA-WORM, HAG, LEECH, LOUSE, MITE, TAPEWORMS, THREAD-WORMS, TRICHINA; also Leuckart, *Parasiten des Menschen* (2d ed. 1881 *et seq.*; trans. by Hoyle, vol. i. Edin. 1886); Küchenmeister, *Parasiten des Menschen* (2d ed. 1878; trans. Ray Society); Cobbold, *Parasites* (1879); Van Beneden, *Vers Intestinaux* (Paris, 1858), *Animal Parasites and Messmates* (Inter. Sc. Series, Lond. 1876); Von Linstow, *Compendium der Helminthologie* (1878); Moniez, *Les Parasites de l'Homme* (1888).

Parasitic Diseases constitute an important sub-group in the accepted classification of Disease (q.v.). In these diseases certain morbid conditions are induced by the presence of animals or vegetables which have found a place of subsistence within some tissue or organ, or upon some surface of the body of man or other animals. Plants are not exempt from disorders of this nature (see PARASITIC PLANTS). The forms of animal life giving rise to parasitic diseases are described in articles on Ascaris, Cestoid Worms, Flea, Guinea-worm, Itch, Lice, Nemathelmia, Strongylus, Tape-worms, Thread-worms, Tick, Trichina, &c.

The vegetable organisms which are associated with special diseases are almost all of microscopic size, and therefore, though their effects are of much greater importance than those of animal parasites, they are as yet much less perfectly understood. Certain minute fungi have long been recognised as the causes of diseases in the skin and mucous membranes: Favus, Pityriasis versicolor, Ring-worm, Thrush (q.v.). It was shown in 1861 by Carter that a serious disease of the foot which occurs in India (Madura-foot, fungus-foot, &c.) is due to the presence of a fungus; and in 1877 what is now called Actinomycosis (q.v.) was put in the same category.

But the most important and interesting of the vegetable parasites are those belonging to the Schizomycetes or Bacteria (q.v.), whose study has assumed such prominence that it is now almost an independent science (Bacteriology). The relations of these organisms to their host are much more intimate than in the case of the larger parasites, and the problems presented by the diseases associated with them are consequently much more difficult of solution; but in some cases the parasitic nature of these diseases has been completely established. Analogy makes it probable that some day all 'specific febrile diseases' will have to be included in this group. See GERM THEORY.

Parasitic Plants are those which, unable to nourish themselves, prey upon other plants or animals; becoming attached, they gain access to the tissues of their host and feed upon its juices. They are more or less degenerate, according to the extent of their parasitism. Any climbing plant is so far a parasite, but, not drawing any nourishment from its host, merely using it as a support, it can live without it, and is perfect in all its parts. Many parasites have probably developed from such plants. The mistletoe, on the other hand, has no roots in the ground; its seed is left by a bird upon an apple or an oak tree, to which, when it begins to grow, it becomes attached by means of special organs called haustoria, which act as roots and enable it to draw crude sap, water, and salts from its host, and having green leaves it can absorb carbonic acid from the air, and elaborate food for its tissues. In the case of the dodder, again, which begins life as an independent plant, the seed germinates underground; when the young plant reaches the surface it fastens upon some host, twining round it, sending its haustoria deep into the tissues, and drawing all its nourishment from them; it bears no green leaves, but only flowers, while the part in the ground dies. In the Rafflesiaceæ, a foreign order, remarkable for the size of the flowers of some of its genera, the degradation has gone still further, and the whole plant consists of haustoria, a knob-like mass of tissue half formed by the host, and the flowers. There are some parasites which are attached to the roots instead of the stems of their hosts—e.g. Yellow Rattle, Cow-wheat, Eyebright. The attachment by the haustoria is always remarkably intimate; their tissues are always joined to the corresponding ones of the host, often in such a way that it is difficult to say to which plant they belong. The ovules of many parasites are rudimentary, the embryo is small and without chlorophyll; in cases of advanced parasitism it may even produce no leaves. There are parasitic genera in many orders—e.g. Corallorhiza in the Orchideæ, Cuscuta in Convolvulaceæ, Orobranche in Labiatifloræ, Monotropa in Pyrolaceæ. The Loranthaceæ, of which is Viscum the mistletoe, the Balanophoreæ, and the Santalaceæ are families of doubtful affinity. Nearly all these parasites have a marked preference for a particular species of host, and they are all flowering plants. But there are many others; two whole classes, the Bacteria and the Fungi, are either parasitic or, what is much the same thing, saprophytic —i.e. dependent upon decaying organic matter for food. The Bacteria have animals as their hosts, and cause in them many diseases, the species being often recognised by the disease. When they are saprophytic they cause fermentation and putrefaction. The Fungi are many of them a trouble in agriculture, causing corn, hop, and vine mildew, potato disease (see PLANTS, DISEASES OF), and also salmon disease; others, like the mushroom, are saprophytes. Allied to parasitism is Symbiosis (q.v.), a sort of mutually arranged parasitism for the benefit of both parties; as in the case of the Lichens, which consist of Algæ and Fungi in partnership.

Paratoluidin. See TOLUIDIN.

Paray-le-Monial, a town in the French department of Saône-et-Loire, 48 miles by rail W. by N. of Mâcon, celebrated for its chapel, in which Mary Alacoque (d. 1690) believed herself to have had a vision of the Saviour, now the object of pilgrimages by the confraternities of the Sacred Heart (q.v.). Pop. 3269.

Parcæ. See FATE.

Parchim, a town of Mecklenburg-Schwerin, 23 miles SE. of Schwerin. Pop. 9726.

Parchment (Fr. *parchemin*, Lat. *pergamena*, through Gr. from *Pergamus*). At a very early period the skins of animals were used for writing upon. Some authors who have written on the subject of ancient writing materials think that the king of Pergamos brought the art of making parchment to perfection through Ptolemy Epiphanes having prohibited the exportation of papyrus from Egypt. The Romans appear to have written chiefly on papyrus, and this practice was continued in Italy till about the 10th century, but parchment was also used; and from that time till ordinary paper became available in the 14th century parchment was almost the only material employed (see PALÆOGRAPHY, PAPER). To a limited extent wax tablets and leaden plates were written upon as late as the 14th and 15th centuries, and some of these are preserved at Florence. Some of the earliest printed books were done on vellum (a name originally given to a parchment made of calf-skin), and on a specially fine quality of this substance, made from the skins of calves prematurely born, some of the best of the early miniature portraits were painted. Ordinary parchment is chiefly made of sheep-skins, but those of calves and goats are

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also used. Fine parchment and vellum are prepared from the skins of kids, lambs, and young calves. A coarser parchment for drumheads, tambourines, &c. is manufactured from the skins of male goats, wolves, and calves. A peculiar kind is made from asses' skin, and for bookbinders' use a parchment is sometimes prepared from pigskin. The early stages in the manufacture of parchment are the same as for Leather (q.v.). After being unhaired and cleaned, the skins are stretched evenly upon a stout wooden frame called a *horse*. The flesh side of the skin is first gone over with a double-edged semicircular knife (fleshing-tool) to remove adhering particles of flesh. With the fleshing-tool inverted, to prevent any cutting of the epidermis, the other side of the skin is then scraped to remove dirt and to squeeze out some of the absorbed water. For some purposes for which stout parchment is required the skin is now merely allowed to dry on the frame, no further treatment being required. But fine parchment for writing or drawing upon, some of which is made from split skins, is sprinkled over with sifted chalk on the flesh side and rubbed smooth with a flat surface of pumice-stone. The grain side of the skin also is rubbed over with pumice, but no chalk is used. In these operations great care requires to be taken not to fray the surface, and certain precautions are necessary during the drying of the parchment. Any considerable roughness or unequal thickness is removed by the skin being again scraped and pumiced.

VEGETABLE PARCHMENT.—This substance, which excited much interest and curiosity when it was first introduced, was patented by Mr W. E. Gaine in 1853 (no. of specification, 2834). It is made by dipping ordinary unsized paper for a few seconds in concentrated sulphuric acid mixed with one-half its volume of water, and then quickly removing all trace of the acid. The mixture is allowed to cool before being used. This simple treatment produces a remarkable change in the paper. It acquires a parchment-like texture; turns translucent, especially when thin; and becomes about five times stronger than ordinary paper. Vegetable parchment is also impervious to water, but is rendered soft and limp when dipped into it. The acid produces a molecular change in the Cellulose (q.v.) of which paper consists. A solution of chloride of zinc acts on paper in a similar way. In the manufacture of vegetable parchment a roll of paper is by a mechanical arrangement pulled through a vat containing the sulphuric acid (the time of immersion being from five to ten seconds for thin paper), next through water, then through a weak solution of ammonia, and once more through water. It is afterwards passed through felt-covered rollers, and then calendered. Stout qualities of vegetable parchment have been used for book-covers and for writing deeds upon. Thin sheets of it serve as a convenient material for tracing designs, plans, &c. But it is now chiefly employed for covering jars of preserves and for like purposes.

Pardoe, JULIA, born at Beverley in 1806, published poems and a novel in her fifteenth year, and *Traits and Traditions of Portugal* in 1833. A visit to Constantinople in 1836 led to her *City of the Sultan, Romance of the Harem*, and *Beauties of the Bosphorus*. She next visited Hungary, and wrote *The City of the Magyar*, and a novel, *The Hungarian Castle* (1842). A series of works deal with French history—*Louis XIV. and the Court of France* (1847), *The Court and Reign of Francis I.* (1849), *The Life of Mary de Medecis* (1852; new ed. 1891), *A Pilgrimage in Paris*, and *Episodes of French History* (1859). Others of her numerous works are *The Confessions of a Pretty Woman*, *Flies in Amber*, *The Jealous Wife*, *Reginald Lyle*, *Lady Arabella*, and *The Thousand and One Days*. She received a pension of £100 in 1859, and died 26th November 1862.

Pardon, in Law, is the remission of the penalty inflicted on an offender who has been tried and convicted, and is an act of grace rather than of justice. The right should be used with great discretion in rectifying an obvious miscarriage of justice, or where, through the inevitable imperfection of all laws, individual cases or offences seem to be visited with too severe a penalty. The power to grant pardons has usually in all monarchical states been regarded as the prerogative of the sovereign; in England a law of 1536 (Henry VIII.) expressly denies to any other than the king the power to pardon or remit treasons or felonies. In republican countries the people is sovereign, but the pardoning power is usually delegated to the head of the executive government for the time being. The United States constitution gives the power to the president to grant reprieves or pardons for offences against the United States, except in cases of impeachment; and in all but seven of the states of the Union the same power is conferred on the governor. In Florida the pardoning power is vested in the governor, the justices of the supreme court, and attorney-general, or a major part of them; in Louisiana the governor pardons only on the recommendation of the lieutenant-governor, the attorney-general, and the presiding judge of the court which tried the case—but only the general assembly may pardon in cases of impeachment and treason; in New Hampshire and Vermont the governor exercises the power with the aid of the executive council; and in New Jersey, Ohio, and Pennsylvania there are boards of pardons—in New Jersey the board consists of the governor, the chancellor, and six judges of the court of errors and appeals. In Britain pardon may also be granted by the supreme authority of the House of Commons; Acts of Indemnity (q.v.) are practically grants of pardon. The sovereign's power of pardon is at all times limited. Thus, he cannot pardon certain offences specified by law (21 Geo. III. chap. 49, excludes the power to pardon convictions for forms of Sabbath-breaking); the king cannot pardon in a matter of private, as opposed to public, wrong, though fines may be remitted in such cases. The endurance of the penalty is said to work out a *constructive* pardon; and the effect of pardon, constructive or other, is to put the offender legally in the position of an innocent man, so that he may proceed at law against any one who thereafter calls him traitor or felon. But civil rights are not overridden by pardon; the injured person may recover damages from a pardoned offender. In modern times the crown's prerogative is delegated, the crown acting not personally but on the representation of the home secretary, the secretary for Scotland, and the lord-lieutenant in Ireland. The pardon is by warrant under the Great Seal, or under the sign-manual countersigned by a secretary of state. To those who have been unjustly convicted, their innocence being subsequently proved, not merely is a free pardon granted, but compensation may also be allowed (see IMPRISONMENT). A notable case of a free pardon long after the condemnation is that of the Earl of Dundonald (q.v.). See also INDULGENCE.

Pardubitz, a town of Bohemia, on the left bank of the Elbe, 55 miles by rail E. of Prague, has a fine 16th-century castle. Pop. 10,292.

Paré, AMBROISE, the father of modern surgery, was born about the beginning of the 16th century, at Laval, in the French department of Mayenne, was trained at the Hôtel Dieu of Paris, and in

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1536 as surgeon joined the army starting for Italy. In a later campaign he improved the mode of treatment of gunshot wounds, which had up to this time been of the most barbarous kind—namely, cauterisation with boiling oil. It was during this campaign that he substituted ligature of the arteries for cauterisation with a red-hot iron after amputation. Many other important improvements in surgery were introduced by him at this time. In September 1552 he was appointed surgeon to King Henry II., and afterwards to Charles IX. and Henry III. He died at Paris, December 22, 1590. His writings, of which the principal was *Cinq Livres de Chirurgie* (1562), have exercised a great influence on the practice of surgery in all countries. See his Life by Paulmier (Paris, 1884).

Paregoric, or PAREGORIC ELIXIR (from the Gr. *parégoricos*, 'soothing'), the *Compound Tincture of Camphor* of the British Pharmacopœia, consists of an alcoholic solution of opium, benzoic acid, camphor, and oil of anise, every fluid ounce containing 2 grains each of opium and benzoic acid, and 1½ grains of camphor. This preparation is much used both by the profession and the public. In doses of from 30 to 60 drops it is an excellent remedy for the chronic winter-cough of old people, the opium diminishing the bronchial secretion and the sensibility of the pulmonary mucous membrane, while the benzoic acid and oil of anise act as stimulating expectorants. It has also been found useful in chronic rheumatism, and, especially in the case of children, to relieve slight pains in the stomach and bowels.

Pareira-Brava, a lofty climbing shrub inhabiting the forests of Peru and Brazil, which bears bunches of oval berries resembling grapes. The botanical source was for some time obscure, but it is now known that the plant yielding the root of commerce is the *Chondodendron tomentosum* (ord. Menispermaceæ). The plant has a long branching woody root, of a yellowish to greenish brown colour internally, and this has attained considerable reputation in medicine. The root contains a bitter principle, and is used in chronic catarrhal affections of the bladder and in calculus. The decoction and fluid extract are most usually employed, but it is sometimes given in the simple form of powder.—This medicinal root has been referred, but erroneously, also to the allied *Cissampelos pareira*, a climbing shrub of the West Indies and Mexico, and to the *Botryopsis platyphylla*—both of which plants have roots possessing similar properties.

Parella, a name given to some of those crustaceous lichens which are used to produce Archil, Cudbear, and Litmus, but which more strictly belongs to one species, *Lecanora parella*, and the red or crimson dye prepared from it.

Parenchyma, a technical name for that kind of vegetable tissue in which the component cells are roundish or polyhedral, touching each other by their broad faces, fitting more or less closely, as in the green 'palisade-parenchyma' of the upper part of a leaf, or leaving wide intercellular spaces, as in the 'spongy parenchyma' of the lower part. See CELL, LEAF.

Parent and Child. The legal relation between parent and child is one of the incidents or consequences of the relation of husband and wife, and flows out of the contract of marriage. The legal is to be distinguished from the natural relation, for two persons may be by the law of nature parent and child, while they are not legally or legitimately so. Hence a radical distinction exists between natural or illegitimate and legitimate children, and their legal rights as against their parents respectively are very different. Legitimate children are the children of two parents who are recognised as married according to the laws of the country in which they are domiciled at the time of the birth; and, according to the law of England, if a child is illegitimate at the time of the birth, nothing that can happen afterwards will ever make it legitimate, the maxim being 'once illegitimate always illegitimate.' In Scotland, on the other hand, a child born of parents who were not married at the time of the birth is made legitimate by their subsequent intermarriage. For a statement of the law relating to illegitimate children, see the articles BASTARD, AFFILIATION, LEGITIMATION, and see also FAMILY, INFANT.

As regards the maintenance of the child, it is somewhat singular that, according to the law of England, there is no duty whatever on the parent to support the child, and consequently no mode of enforcing such maintenance. The law of nature was probably considered sufficient to supply the motives which urge a parent to support the child, but the municipal law of England has not made this duty compulsory. This defect was to some extent remedied when the Poor Law was created by statute in the reign of Elizabeth: by that law parents and children are compellable to a certain small extent, but only when they have the pecuniary means to do so, to support each other, or rather to help the parish authorities to do so. But apart from the poor-law statutes there is no legal obligation on the parent to support the child, nor on the child to support the parent. Hence it follows that, if the child is found in a destitute state, and is taken up, fed, clothed, and saved from starvation by a stranger, it is questionable whether such a stranger can sue the parent for the expense, or any part of it, however necessary to the child's existence. In order to make the father liable for maintenance there must in all cases be made out against him some contract, express or implied, by which he undertook to pay for such expense; in other words, the mere relationship between the parent and child is not of itself a ground of liability. But when the child is living in the father's house, it is always held by a jury or court that slight evidence is sufficient of, at least, an implied promise by the father to pay for such expenses. For example, if the child order clothes or provisions, and the father see these in use or in process of consumption, it will be taken that he assented to and adopted the contract, and so will be bound to pay for them. So, if a parent put a child to a boarding-school, very slight evidence of a contract will be held sufficient to fix him with liability. Nevertheless, in strictness of law, it is as necessary to prove a contract or agreement on the part of the parent to pay for these expenses as it is to fix him with liability in respect of any other matter. If a child be put under the care and dominion of an adult person, and the latter wilfully neglect or refuse to feed or maintain such child, whereby the child dies or is injured, such adult will incur the penalties of misdemeanour; but this offence does not result from the relationship of parent and child; it may arise between an adult and child in any circumstances, as where a child is an apprentice or servant. If a parent runs away and deserts his children, leaving them destitute and a burden on the parish, the overseers are entitled to seize and sell his goods, if any, for the benefit and maintenance of such children; and if the parent so deserting the children be able by work or other means to support them, such parent may be committed to prison as a rogue and vagabond. Not only, therefore, is a parent during life not bound to maintain his or her child (with the above exceptions), but after the parent's death the executors or other representatives of the parent, though in possession of

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funds, are also not bound. It is true that if the parent die intestate both the real and personal property will go to the children; but the parent is entitled, if he choose, to disinherit the children, and give away all his property to strangers, provided he execute his will in due form, which he may competently do on death-bed if in possession of his faculties.

A father has the right to the custody of his child until majority at least, as against third parties, and no court will deprive him of such custody except on strong grounds. Whenever the child is entitled to property, the court so far controls the parental right that, if the father is shown to act with cruelty, or to be guilty of immorality, a guardian will be appointed. The court has often to decide in cases of children brought before it by *habeas corpus*, when parties have had the custody against the father's will. In such cases, if the child is under fourteen, called the age of nurture, and the father is not shown to be cruel or immoral, the court will order the child to be delivered up to him; but if the child is above fourteen, or, as some say, above sixteen, the court will allow the child to choose where to go. If the parents separate by agreement, no stipulation will be enforced which is prejudicial to the child. In case of divorce or judicial separation the Court of Divorce has power to direct who is to have the custody of the children. The law lays upon fathers the duty of providing their children with an elementary education in reading, writing, and arithmetic; and a father has the right, which the court will not interfere with except on special grounds, to have his children educated in his own religious faith.

Scotland.—The law of parent and child in Scotland differs in some respects from the law of England and Ireland. In Scotland there is a legal obligation on parents and children to maintain each other if able to do so, and either may sue the other for aliment at common law; but this obligation extends only to what may be called subsistence money, although this does not mean merely relief of the poor-law authorities, but is held to vary according to the social position of the party. As regards all maintenance beyond mere subsistence, the law does not materially differ from that of England, and a contract must be proved against the father before he can be held liable to pay. The legal liability as between parent and child is qualified in this way by the common law, that if a person has both a father and a child living and able to support him, then the child is primarily liable, and next the grandchild, after whom comes the father, and next the grandfather. Not only are parent and child liable to support each other while the party supporting is alive, but if he dies his executors are also liable; and this liability is not limited by the age of majority, but continues during the life of the party supported. Another advantage which a Scotch child has over an English child is that the father cannot disinherit it—at least so far as concerns his movable property (see LEGITIM). With regard to the custody of children in Scotland, the rule is that the father is entitled to the custody as between him and the mother. His right, however, is not absolute, but subject to the equitable jurisdiction of the Court of Session, which makes such orders regarding custody as are dictated by a regard for the health, interests, and moral education of the child. In actions for separation or divorce this court has power to make such orders as are just and proper regarding the custody of the children of the spouses.

By the Guardianship of Infants Act, 1886, increased rights were given to the mothers of lawful children both in England and Scotland. The general effect of the enactment is to place the mother of children whose father is dead in a similar position to that which the father would have occupied had he been alive in regard to the guardianship.

United States.—The American law closely follows that of England on this head, save in regard to the age (usually eighteen) at which women cease to be infants. See INFANT, AGE.

Parhelion. See HALOS.

Pariahs is the Tamil name now generally given to the lowest class of the Hindu population of Southern India—the 'out-castes' who do not belong to any of the four castes of the Brahminical system (the Telugu name is *Mala*, the Kanarese *Holia*, the Malayalim *Paliyar*). In the Madras Presidency they numbered, in 1881, 4,439,253, or 15·58 per cent. of the total population, or four times as numerous as the Brahmans. Presumably they represent the aboriginal race conquered by the Sudras, themselves a stock vanquished by the Vedic peoples. In the 18th century Pariahs were slaves to the higher castes; they must still dwell in huts outside village bounds, but are frugal, pleasure-loving, and laborious. See CASTE.—For the Pariah Dog, see DOG.

Paris, the capital of France, and the largest city in Europe after London, is situated in 48° 50′ N. lat. and 2° 20′ E. long., on the river Seine, about 110 miles from its mouth. It lies in the midst of the fertile plain of the Île-de-France, at a point to which converge the chief tributaries of the river, the Yonne, the Marne, and the Oise. These streams, navigable for the small vessels formerly used in commerce, gave it until recent times the advantages of a seaport, while the great trade-routes passing along their valleys connected it with all parts of France. It is still the centre of a great network of rivers, canals, roads, and railways; hence its commercial importance. Paris has occupied since Roman times a constantly increasing series of concentric circles. The present city is bounded by fortifications—a rampart upwards of 22 miles in length, begun in 1840 and completed twenty years afterwards. The extension of the city boundary to this line explains the increase of population from 1,174,346 in 1856 to 1,696,741 in 1861; subsequent pop. (1866) 1,825,274; (1881) 2,269,023; and (1886) 2,256,050. Paris has within the fortifications a mean elevation of about 120 feet, but it rises in low hills north of the Seine, Montmartre (400 feet) and Belleville (320 feet), and south of the Seine, the Montagne Sainte Geneviève (190 feet). These elevations are encircled at a distance of from two to five miles by an outer range of heights, including Villejuif, Meudon, St Cloud, and Mont-Valérien (650 feet), the highest point in the immediate vicinity of the city. The Seine, which enters Paris in the south-east at Bercy, and leaves it at Passy in the west, divides the city into two parts, and forms the two islands of La Cité and St Louis, which are both covered with buildings.

France has long been the most highly centralised country in Europe, and Paris as its heart contains a great population of government functionaries. Paris is a city of pleasure, and attracts the wealthy from all parts of the world. These wealthy inhabitants make it a city of capitalists and a great financial centre. The provincial universities of France have been deprived of their attraction by the schools of Paris, to which flock the youth of France. The publishing trade has followed the same course. Paris cannot be described as a manufacturing town. Its chief and peculiar industries produce articles which derive their value not from the cost of the material,

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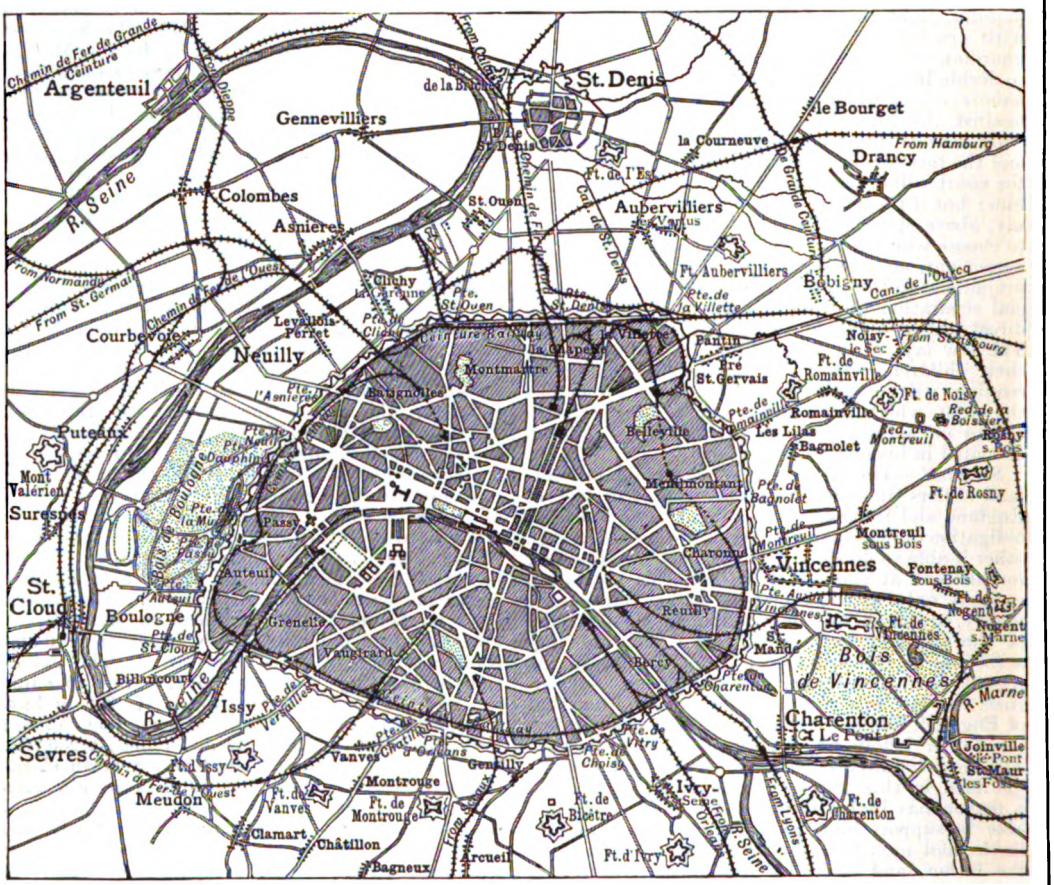
but from the skill and taste bestowed on them by individual workmen. They include jewellery, bronzes, artistic furniture, and decorative articles known as 'articles de Paris.' In consequence of the intelligence and taste required in their trades, the Paris workmen are in many respects superior to the machine hands of manufacturing cities. The absence of extreme poverty among them and their well-to-do appearance strike the English visitor.

Before speaking in detail of the streets, boulevards, and *places* or squares of Paris, it is proper to mention that the private houses as well as the public buildings are built of a light-coloured limestone, quarried in the neighbourhood of the city, easily cut with the saw and carved ornamentally with the chisel. With this material they are reared in huge blocks to a height of six or seven stories, each floor constituting a distinct dwelling; access to all the floors in a tenement being gained by a common stair, which is usually placed under the charge of a porter or *concierge* at the entrance. Very frequently the tenements surround an open quadrangle, to which there is a spacious entry, the gate of which (the *porte cochère*)


Argenteuil
Gennevilliers
St. Denis
le Bourget
la Courneuve
Drancy
From Hamburg
R. Seine
Colombes
Asnieres
St. Ouen
Aubervilliers
Pantin
Bobigny
Courbevoie
Neuilly
Montmartre
Belleville
Les Lilas
Bagnolet
Romainville
Noisy-le-Sec
Puteaux
Mont Valérien
Suresnes
St. Cloud
Boulogne
Auteuil
Passy
Grenelle
Vaugirard
Montparnasse
Reuilly
Charonne
Vincennes
Montreuil sous Bois
Fontenay sous Bois
Nogent s. Marne
Bois de Vincennes
Charenton
Le Pont
Joinville le Pont
St. Maur des Fossés
Billancourt
Issy
Sevres
Meudon
Vanves
Montrouge
Clamart
Châtillon
Bagneux
Arcueil
Gentilly
Ivry-sur-Seine
Bicêtre
Ft. d'Ivry
Ft. de Vincennes
Ft. de Charenton
Ft. de Noisy
Ft. de Rosny
Ft. de Romainville
Ft. de Montrouge
Ft. de Vanves
Ft. de Bicêtre
Ft. d'Issy
Ft. Aubervilliers
Ft. de l'Est
Ft. de la Villette
Ft. de la Chapelle
Ft. de Clichy
Ft. de St. Ouen
Ft. de la Briche
Ft. de St. Denis
Ft. de Passy
Ft. de la Muette
Ft. de Neuilly
Ft. de Dauphine
Ft. de St. Cloud
Ft. de Billancourt
Ft. de Vaugirard
Ft. de Montparnasse
Ft. de Gentilly
Ft. de Choisy
Ft. de Vitry
Ft. de Charenton
Ft. de Bercy
Ft. de Reuilly
Ft. de Picpus
Ft. de Montreuil
Ft. de Bagnolet
Ft. de Romainville
Ft. de la Villette
Ft. de la Chapelle
Ft. de St. Denis
Ft. de St. Ouen
Ft. de Clichy
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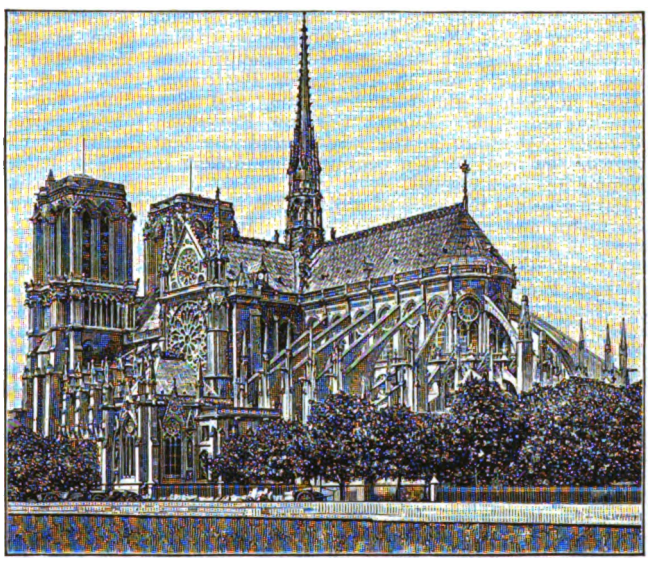
Ft. de Issy
Ft. de Billancourt
Ft. de St. Cloud
Ft. de Dauphine
Ft. de Neuilly
Ft. de la Muette
Ft. de Passy

that famous prison and fortress; the Place Royale, with its two fountains and a statue of Louis XIII.; the Place de l'Hôtel de Ville, formerly Place de la Grève, for many ages the scene of public executions. Triumphal arches are a feature in the architecture of Paris. The Porte St Martin and Porte St Denis were erected by Louis XIV. to commemorate his victories in the Low Countries, and are adorned with bas-reliefs representing events of these campaigns; the Arc de Triomphe de l'Étoile was begun by Napoleon in 1806, and completed in 1836 at a cost of more than £400,000. This arch, which bounds the Champs-Elysées, has a total height of 152 feet and a breadth of 137. It is profusely adorned with bas-reliefs and alto-reliefs, some of which, representing the departure and return of the Grande Armée, are masterpieces of sculpture. The great streets which radiate from the Arc de Triomphe were among the most magnificent of those constructed by Napoleon III., and make this monument of the Bonaparte family the most conspicuous in Paris. A great avenue runs east from it to the Palace of the Louvre, in the heart of the city.

The Seine in passing through Paris is spanned by twenty-eight bridges. The most celebrated and ancient are the Pont Notre Dame, erected in 1500, and the Pont-Neuf, begun in 1578, completed by Henri IV. in 1604. This bridge, which crosses the Seine at the north of the Île-de-la-Cité, is built on twelve arches, and abuts near the middle on a small peninsula, jutting out into the river, and planted with trees, that form a background to the statue of Henri IV. on horseback, placed in the central open space on the bridge. The bridges all communicate directly with spacious quays, planted with trees, which line both banks of the Seine, and which, together with the Boulevards, give special characteristic beauty to the city. During the last two centuries of the 'ancien régime' the Pont-Neuf was the centre of Paris. It was a meeting-place of showmen and charlatans, and there popular orators addressed the mob. Early in the 12th century Ogival or Gothic architecture took its rise in Paris, or the district immediately surrounding it, this event being one of the most memorable in the history of art. Unfortunately the Parisians, with an impatience of everything not in the latest fashion, long neglected their old buildings in the style they had originated. Their Gothic churches were disfigured by incongruous additions and tawdry ornaments, which make them uninteresting if not repulsive to visitors. This remark, however, does not apply to the first two churches we shall mention. They have been admirably restored, and it is now difficult to say whether their incomparable beauty is to be more attributed to mediæval builders or to the modern architects by whom they have been renovated.

Among the parish churches of Paris (upwards of sixty in number) the grandest and most interesting, from a historical point of view, is the cathedral of Notre Dame, which stands on a site successively occupied by a pagan temple and a Christian basilica of the time of the Merovingian kings. The main building, begun in the 12th century, is 400 feet long, 150 feet wide, and 110 high. The height of two towers is 218 feet, that of the flèche 300 feet. The interior consists of a principal and two flanking naves, which are continued round the choir. It has been said that if the pillars of Notre Dame could speak they might tell the whole history of France. The kings, however, were crowned at Rheims, and the only royal coronation celebrated at Notre Dame was that of Henry VI. of England in 1431. There, too, was sung in 1436 a memorable *Te Deum* when Paris was retaken by the troops of Charles VII. During the French Revolution the church was mutilated in order to destroy what were supposed erroneously to be emblems of royalty. In 1793, after childish and repulsive mockeries of the ceremonies of the Roman Catholic Church, it was converted into a 'temple of reason.' In 1804 Napoleon I. at the height of his power resolved to impress Europe by an imposing ceremony—that of his coronation—in Notre Dame; and there it was that he, in presence of the pope, who never before had crossed the Alps at the bidding of king or emperor, rudely placed the crown upon his own head. In 1831 the novel of Victor Hugo, *Notre Dame*, made the church interesting to all Europe. In France there was a general desire for its restoration, and in 1845 this great work was undertaken by the state. Viollet-le-Duc added to the building the great flèche, a structure of oak and lead; and under the care of some of the ablest architects of France the church was converted into what is now described in Paris as the noblest of Gothic buildings. The Sainte Chapelle, built by St Louis in 1245–48, for the reception of the various relics which he had brought from the Holy Land, is perhaps the greatest existing masterpiece of Gothic art. Restored by Napoleon III. at a cost of £50,000, it was threatened by the Commune, but saved. One of the most interesting churches in Paris is St Séverin, buried in narrow streets of the Quartier Latin. A large part of it is in the English Gothic of the 15th century, showing that it was erected during the English occupation of Paris. St-Germain-des-Prés, which is probably the most ancient church in Paris, was completed in 1163; St Etienne du Mont and St Germain l'Auxerrois, both ancient, are interesting—the former for its picturesque and quaint decorations, and for containing the tomb of St Geneviève (q.v.), the patron saint of Paris; and the latter for its



Notre Dame: from the River.

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rich decorations and the frescoed portal, restored at the wish of Margaret of Valois. Among modern churches is the Madeleine (1806–42), built in the style of a Corinthian temple, and originally intended by Napoleon I. to be a monument to the Grande Armée. It forms an oblong building, 328 feet long by 138 wide, independently of the flights of steps. The height of the columns is 62 feet, that of the entablature 14 feet, and the entire height from the ground 116 feet. There are in all fifty-two columns. The roof is of iron and copper. The interior is elaborately decorated with gold, white marble, paintings, and sculptures; but in spite of their religious subjects the building still produces on northern eyes the impression of a pagan temple rather than of a Christian church. The Panthéon (1764) was begun as a church, but converted by the Constituent Assembly of republican France into a temple dedicated to the great men of the nation, next restored to the church by Napoleon III. and rededicated to St Geneviève, but once more, on the occasion of the funeral of Victor Hugo (1885), reconverted into a monument, with the old inscription 'Aux grands hommes la patrie reconnaisante.' The Panthéon has been spoken of as rivalling St Peter's at Rome and St Paul's in London. The frescoes of the interior are very fine. In the crypt are the tombs of Voltaire, Rousseau, and Victor Hugo. Notre Dame de Lorette, erected in 1823, is a flagrant specimen of the meretricious taste of the day; and St Vincent de Paul, completed in 1844, is somewhat less gaudy and more imposing in style. Among the few Protestant churches, l'Oratoire is the largest and the best known. In front of it a beautiful monument to Coligny has been erected.

Paris abounds in places of amusement suited to the tastes and means of every class. It has upwards of forty theatres. The leading houses are the Opéra, the Théâtre Français—chiefly devoted to classical French drama—the Opera Comique, and the Odéon, which receive a subvention from government. The new opera-house, completed in 1875, is one of the most magnificent buildings of this century, costing, exclusive of the site, £1,120,000. Cheap concerts, equestrian performances, and public balls, held in the open air in summer, supply a constant round of gaiety to the burgher and working classes at a moderate cost, and form a characteristic feature of Paris life; while, in addition to the noble gardens of the various imperial palaces, the most densely-crowded parts of the city have public gardens, shaded by trees and adorned with fountains and statues, which afford the means of health and recreation to the poor. Beyond the fortifications at the west of Paris is the Bois de Boulogne, converted by Napoleon III. from a wood covered with stunted trees into one of the most beautiful gardens in Europe. It takes the place of the London parks for the fashionable world of Paris. East of Paris is the Bois de Vincennes, an admirable recreation ground for the working-classes.

Paris has three large and twelve lesser cemeteries, of which the principal one is Père-la-Chaise (see LACHAISE), extending over 200 acres, and filled in every part with monuments erected to the memory of the countless number of celebrated persons buried there. The Morgue (q.v.) at the upper end of the Île-de-la-Cité is a building in which the bodies of unknown persons found in the Seine are placed temporarily for recognition. The southern parts of Paris are built over beds of limestone, which have been so extensively quarried as to have become a network of vast caverns. These quarries were first converted in 1784 into catacombs, in which are deposited the bones of the dead, collected from the ancient cemeteries of Paris.

It has been frequently remarked that Paris contains few important civil buildings of the middle ages, which is to some extent due to the reckless way in which improvements have been carried out. What Paris has lost in picturesque interest and architectural variety from this cause was brought home to all by the large imitations of the Tour de Nesle and other buildings erected for the exhibition of 1889. A government commission now watches over the historic monuments of Paris, so that further destruction is checked. Two most interesting civil buildings of the 15th century still exist. One is the Hôtel de Cluny (see CLUGNY), one of the finest existing monuments of the Gothic Flamboyant style. The other is the Hôtel de Sens, the old palace of the archbishops of Sens, formerly metropolitans of Paris. It is unfortunately buried among narrow streets north of the Seine and opposite the Cité. In 1890 its most interesting part was advertised 'to let for business purposes.' It had been last used as a sugar-refinery.

The Louvre, the greatest of the modern palaces of Paris, forming a square of 576 feet by 538 feet, was erected on the site of an old castle of the 13th century (see below). The first part, the south-west wing, was erected in 1541 on the plans of Pierre Lescault. It remains a masterpiece of architectural design and monumental sculpture. The principal portion of the great square was completed under Louis XIV. in the latter part of the 17th century, the physician Claud Perrault being the architect. The colonnade of the eastern façade is more admired than any other part of the building.

The Palace of the Tuileries was begun in 1566 by Catharine de Medicis, and enlarged by successive monarchs, while used as a royal residence, until it formed a structure nearly a quarter of a mile in length, running at right angles to the Seine. It was connected with the Louvre, which lay to the west, by a great picture-gallery overlooking the Seine, and 1456 feet in length. North of the picture-gallery, and between the two palaces, lay the Place du Carrousel, in the midst of the most magnificent palatial structure in the world. The Tuileries continued to be occupied as the residence of the imperial family; but the Louvre proper formed a series of great galleries filled with pictures, sculptures, and collections of Egyptian, Greek, and Roman antiquities. The Commune attempted to burn the whole pile, but only succeeded in destroying the Tuileries and a corner of the Louvre. The Place du Carrousel enclosed between them and the Louvre is now thrown into the great line of gardens stretching west to the Arc de l'Étoile. In the midst of the old palaces a statue of Gambetta, surrounded by allegorical figures, has been erected. North of the Louvre is the Palais Royal. It forms a mass of buildings, including the old palace of the Orleans family, the Théâtre Français, and a quadrangle of shops, restaurants, and cafés, enclosing a large park or garden open to the public, 700 feet long by 300 feet wide. With its avenues and parterres it was long one of the liveliest and most frequented spots in Paris. Its cafés had a world-wide reputation, which has faded, however, since the great improvements of Napoleon III. sent the current of life into other quarters. The most valuable part of the palace, fronting the Rue St Honoré, was set fire to by order of the Commune in 1871. The Palace of the Luxembourg, on the south side of the Seine, was built by Marie de Medicis in the Florentine style. It contains many magnificent rooms, and in 1879 became the meeting-place of the French senate. Close to it a gallery has been constructed for the reception of the works of living artists acquired by the state. On the north bank of the Seine, opposite the Island

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of the Cité, stands the Hôtel de Ville. It was burned by the Commune, but has been rebuilt and restored in the style of its predecessor, and is now one of the finest buildings in Paris. On the Island of the Cité stands the Palais de Justice, a vast pile, also set fire to by the Commune; some parts of it date from the 14th century, and others are modern. It is the seat of some of the courts of law, as the Courts of Cassation, of Appeal, and of Police. Within the precincts of this palace are the Sainte Chapelle, and the noted old prison of the Conciergerie, in which Marie Antoinette, Danton, and Robespierre were successively confined.

The Conciergerie, just mentioned, in which prisoners are lodged pending their trial, constitutes one of the eight prisons of Paris, of which the principal is La Force. The Nouveau Bicêtre is designed for convicts sentenced to penal servitude for life; St Pélagie receives political offenders, St Lazare is exclusively for women, the Madelonnettes for juvenile criminals, and Clichy for debtors.

The number of benevolent institutions is enormous. The largest of the numerous hospices or almshouses is La Salpétrière, probably the largest asylum in the world, extending over 78 acres of land, and appropriated solely to old women; Bicêtre receives only men. The Hospice des Enfans Trouvés, or Foundling Hospital (q.v.), provides for the infants brought to it till they reach the age of maturity, and only demands payment in the event of a child being reclaimed. The Crèches (q.v.) receive the infants of poor women for the day at the cost of 20 centimes. Besides institutions for the blind, deaf and dumb, convalescents, sick children, &c., Paris has many general and special hospitals. Of these the oldest and most noted are the Hôtel Dieu, La Charité, and La Pitié.

The chief institutions connected with the University of France, and with education generally, are still situated in the Quartier Latin. The Sorbonne (q.v.), the seat of the Paris faculties of letters, science, and Protestant theology, has been rebuilt and increased in size. The new building was opened in 1889, when it was announced that a complete reorganisation of the university system of France was contemplated (see UNIVERSITY). The Sorbonne contains lecture-halls and class-rooms, and an extensive library open to the public. There gratuitous lectures are given, and degrees are granted by the University of France. Near the Sorbonne is the Collége de France, where gratuitous lectures are also delivered by eminent scholars and men of letters, as well as a large number of colleges and lycées, the great public schools of France for secondary instruction. Most of them have been recently rebuilt, filling the Quartier Latin with huge barrack-like buildings. The Scotch College stands as it did in the 17th century, five stories high, with eleven windows in a row, a good specimen of the old Paris colleges. At present, owing to the war between the republic and the Roman Catholic Church, the schools of the latter are independent of the university, and there is no faculty of Roman Catholic theology at the Sorbonne. The École Polytechnique, the School of Medicine and the School of Law, the Observatory, and the Jardin des Plantes, with its great museums of natural history, partly rebuilt on a grand scale and opened in 1889, lecture-rooms, and botanical and zoological gardens are situated in the same quarter of Paris. The principal of the public libraries are those of the Rue Richelieu, now called the Bibliothèque Nationale (see LIBRARY), which originated in a small collection of books placed by Louis XI. in the Louvre. It is rivalled only by the British Museum in the number of its books and manuscripts, but its usefulness is impaired by the want of a proper catalogue, which makes its treasures less accessible than they should be.

No city on this side of the Alps is richer than Paris in fine-art collections, and among these the museums at the Louvre stand pre-eminent. Among its chief treasures may be mentioned, in the museum of antique sculptures, the famous Venus of Milo, and in the Salon Carré the great works of the Italian, Flemish, and Spanish masters. It is impossible to do more than refer to the long succession of galleries in which are exhibited Egyptian, Assyrian, Elamitic, Greek, Roman, mediæval, and Renaissance relics and works of art. The Musée Carnivalet or historical museum of the city of Paris has been specially devoted to the collection of everything interesting connected with the municipality. On the demolition of the old houses many objects were found which formed the nucleus of the collection, which is constantly receiving large additions which make it one of the most interesting of the Paris museums. The Palais des Beaux-Arts is used as an exhibition of art, manufactures, and architectural models. The Hôtel de Cluny, connected underground with the Palais des Thermes, contains curious relics of the arts and usages of the French people, from the earliest ages of their history to the Renaissance period. The potteries, sculptures, paintings, arms, furniture, and tapestries of the middle ages and of the 16th and 17th centuries are of the highest historical interest and value. The Museum of Artillery at the Hôtel des Invalides is devoted to arms and armour, flags and war dresses. The Musée Guimet, or 'National Museum of Religions,' includes objects used in religious ceremonies, savage, Indian, Chinese, &c. The Mint deserves notice for the perfection of its machinery; and the Gobelins (q.v.), or tapestry manufactory, may be included under the fine arts, as the productions of its looms are all manual, and demand great artistic skill. The Conservatoire des Arts et Métiers, in the Rue St Martin, contains a great collection of models of machinery, and class-rooms for the instruction of workmen in all departments of applied science. The great Paris exhibitions have all left behind them important buildings. The Palace of Industry, built in 1854, now forms a permanent exhibition. The spacious building in which the exhibition of 1878 took place was named Palace of the Trocadéro, and is now used for musical entertainments and as an architectural and ethnological museum. For the exhibition of 1889 was erected one of the most striking monuments of modern Paris, the Eiffel (q.v.) Tower.

Paris was surrounded, under Louis-Philippe, with fortifications costing £5,500,000 sterling, and, in addition to these, a large number of detached forts have since been erected. The walls, 37,000 yards in length, are penetrated by sixty-nine openings, fifty-six for gates, nine for railways, two for the canals of St Denis and the Ourq. Through the two remaining breaks passes the Seine. At the gates are paid the octroi or town dues, a large source of revenue to the city of Paris. On the left bank of the Seine is the École Militaire, founded in 1752, and used as barracks for infantry and cavalry; it can accommodate 10,000 men and 800 horses. Near it is the Hôtel des Invalides, founded in 1670 for disabled soldiers. The crypt of the church contains the sarcophagus, hewn from a huge block of Russian granite, in which lie the remains of Napoleon, deposited there in 1840.

Paris is divided into twenty arrondissements. The prefect of the Seine is the chief of the municipal government, and is appointed by the government. There is a large municipal council, chosen by popular election. Each arrondissement has a maire and two assistant-councillors. The prefect

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of police is at the head of the civic guard or gens-darmes, the fire-brigade, and the sergents de ville or city police, who are armed with swords. The cleaning, sewerage, and water-supplies of Paris are under the charge of the prefect. Paris is now abundantly supplied with pure and wholesome water; and the sewers have been greatly extended with the street improvements. The same may be said in regard to the paving of the city, and the street-lighting by gas and electricity. In 1818 public slaughter-houses, or abattoirs, were established at different suburbs, where alone animals are allowed to be slaughtered. Large cattle-markets are held near the licensed abattoirs. There are in the heart of the city numerous *halles*, or wholesale, and *marchés*, or retail markets. The principal of these is the Halles Centrales, near the church of St Eustache, covering nearly 20 acres.

History.—The earliest notice of Paris occurs in Cæsar's *Commentaries*, in which it is described, under the name of Lutetia, as a collection of mud huts, composing the chief settlement of the Parisii, a Gallic tribe, conquered by the Romans. Lutetia soon acquired great strategic importance, due to its lines of defence—the windings and marshes of the Seine and Marne to the east and west, and the forest-clad hills on the north and south. It lay midway between the chief enemies of Rome in Gaul, the Germans on the east and the unsubdued Celts of Armorica on the west. In 53 B.C., accordingly, Cæsar assembled there the delegates of the Gallic tribes, and it became an important Roman town. Two ruins of this period remain south of the Seine. One formed part of the Palais des Thermes, the abode of the Roman governors of Lutetia and afterwards of the Merovingian kings of France. The other ruin is that of the *arènes* or amphitheatre of the Roman city. The foundations and parts of the old wall were discovered in 1870, and since then excavations have laid them bare. In 1891 they were enclosed in a small park and thrown open to the public. The amphitheatre was 180 feet long by 153 feet wide. It is estimated that it could contain 10,000 spectators of the gladiatorial shows. Lutetia began in the 4th century to be known as Parisia, or Paris. In the 6th century Paris was chosen by Clovis as the seat of government; and after having fallen into decay under the Carlovingian kings, who made Aix-la-Chapelle their capital, and in whose time it suffered severely from frequent invasions of the Northmen, it finally became in the 10th century the residence of Hugh Capet, and the capital of the French monarchy. From this period Paris continued rapidly to increase, and in two centuries it had doubled in size and population. The reign of Philippe-Auguste (1180–1223) is the great epoch in the mediæval history of Paris. It was then that were erected masterpieces of Gothic art, including the nave, the choir, and the chief façade of Notre Dame and the Sainte Chapelle. Then was founded the University of Paris, the great theological school of the middle ages, wielding a power over the church second only to that of Rome, and attracting from all parts of western Europe vast crowds of students, who, on returning to their homes, spread abroad a knowledge of the art and culture of Paris. Philippe-Auguste built a crenelated wall and flanking towers, one of which, the Tour de Nesle (q.v.), stood on the site of the Palace of the Institute. Outside the wall he erected the castle of the Louvre on the site of the present palace. It became the centre and stronghold of feudalism and the citadel of Paris, which was now, after Constantinople, the greatest city of Europe. In the 16th century the castle was still used as a royal residence, but after the reception of Charles V. there by Francis I. it was pulled down to make way for the new palace. Luckily the walls were not levelled to their foundations. A few years ago they were discovered to exist. Galleries have been excavated, and extensive ruins have been laid bare, which now form the most interesting sight of underground Paris.

In the middle ages Paris was divided into three distinct parts—the Cité, on the islands; the Ville, on the right bank; and the Quartier Latin, or University, on the left bank of the river, and on the Montagne St Geneviève. In 1358 broke out the first of the long series of Paris revolutions. It was headed by Étienne Marcel, the famous provost of the Paris merchants, who for a time ably ruled the town. Louis XI. did much to enlarge Paris and to efface the disastrous results of its hostile occupation by the English during the wars under Henry V. and Henry VI. of England; but its progress was again checked during the wars of the last of the Valois, when the city had to sustain several sieges. On the accession of Henri IV. of Navarre, in 1589, a new era was opened for Paris. The improvements commenced in his reign were continued under the minority of his son, Louis XIII. Louis XIV. converted the old ramparts into public walks or *boulevards*, organised a regular system of police, established drainage and sewerage works, founded hospitals, almshouses, public schools, scientific societies, and a library, and thus renewed the claim of Paris to be regarded as the focus of European civilisation.

The terrible days of the Revolution caused a temporary reaction; but the improvement of Paris was recommenced on a new and grander scale under the first Napoleon, when new quays, bridges, markets, streets, squares, and public gardens were created. All the treasures of art and science which conquest placed in his power were applied to the embellishment of Paris, in the restoration of which he spent more than £4,000,000 sterling in twelve years. His downfall again arrested progress, and in many respects Paris fell behind other European cities. Renovation was recommenced under Louis-Philippe; but as lately as 1834 much of the old style of things remained; the gutters ran down the middle of the streets, there was little underground drainage from the houses, oil-lamps were suspended on cords over the middle of the thoroughfares, and, except in one or two streets, there were no side-pavements. It was reserved for Napoleon III. to reconstruct Paris. When he commenced his improvements Paris still consisted, in the main, of a labyrinth of narrow, dark, and ill-ventilated streets. He resolved to pierce broad and straight thoroughfares through the midst of these—thus putting an end to the possibility of forming barricades—to preserve and connect all the finest existing squares and boulevards, especially those surrounding the monuments of the Bonaparte family, and, in lieu of the old houses pulled down in the heart of the town, to construct, in a ring outside of it, a new city in the most approved style of modern architecture. With the assistance of Baron Haussmann (q.v.), the Prefect of the Seine, his schemes were carried out with rare energy and good taste. With a fresh supply of water, trees, parterres, and fountains were introduced everywhere, and Paris ceased to produce on visitors the impression that it stands in the midst of a chalky desert. It was converted into one of the greenest and shadiest of modern cities. Two straight and wide thoroughfares, parallel to and near each other, crossed the whole width of Paris from north to south through the Cité; a still greater thoroughfare was made to run the whole length of the town, north of the Seine, from east to west. The old boulevards were completed so as to form outer and inner circles of spacious streets—the former chiefly

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lying along the outskirts of the old city, the latter passing through and connecting a long line of distant suburbs. In the year 1867, when the international exhibition was opened, Paris had become in all respects the most splendid city in Europe. Many further improvements were then contemplated. Financial and political difficulties were, however, at hand (see FRANCE), and these schemes had to be postponed. The siege of Paris by the Germans, which lasted from 19th September 1870 to 28th January 1871, caused much less injury to the city than might have been expected—it was reserved for a section of the Parisian population to commit an act of vandalism without a parallel in modern times. On the 18th of March the Red Republicans, who had risen against the government, took possession of Paris. On the 27th March the Commune was declared the only lawful government. Acts of pillage and wanton destruction followed. On the 15th of May the column erected to the memory of Napoleon and the Great Army, in the Place Vendôme, was solemnly pulled down as 'a monument of tyranny.' The government troops under Marshal MacMahon attacked the insurgents, and kept them from doing further mischief. The former succeeded in entering Paris on the 20th of May, and next day the Communists began systematically to set fire with petroleum to a great number of the chief buildings of Paris, public and private. The fire for a time threatened to destroy the whole city. It raged with the greatest fury on the 24th, and was not checked until property had been lost to the value of many millions sterling, and historical monuments were destroyed which never can be replaced. The horror inspired by the Commune for a time drove the wealthy classes from Paris, and it was feared that it would lose its prestige as a European capital. This, however, has not proved to be the case. By the autumn of 1873 all the private houses burned had been rebuilt, the monuments only partially injured had been restored, and the streets and public places were as splendid and gay as in the best days of the empire.

Since the establishment of the republic improvements have been executed little if at all inferior in importance to those of the second empire. New streets have been opened near the Paris Bourse de Commerce and the Post-office; the Champs de Mars, a waste of sand, has been converted into a beautiful garden, in which rises the Eiffel Tower; the museums of the Jardin des Plantes have been rebuilt; the Quartier Latin has been covered with educational buildings. In 1890–91 two great undertakings were mooted—a system of metropolitan railways to connect the great Paris stations with the heart of the city, and the conversion of Paris into a seaport by the deepening of the Seine, or the construction of a ship-canal to the Channel. The enthusiastic advocates of the latter scheme predict that in a few years it will make Paris the largest city in Europe and the centre of the commerce of the world.

Somewhat conflicting opinions are expressed on the part Paris has played in the history of the world. After Athens and Rome, says one writer, it is the city that has made the deepest impression on men's minds. Paris, says another, has carried the torch of life and civilisation from century to century, and done most to spread culture and enlightenment throughout the globe. At this moment, says a third, the inhabitants are the best fed and best clad, the best educated of city populations. These views are generally accepted in France. There is, however, a reverse to the picture. The Parisians are declared to be a feeble people, dying out, and constantly recruited by immigration from Belgium, Alsace, Switzerland, and Italy. Paris is a modern Babylon; its domestic life, described in French novels, is a centre of corruption for Europe. There has been, no doubt, truth in all these views at different periods of the history of Paris. Certain it is, however, that in England it is too often forgotten that in Paris drunkenness is almost unknown, that among a large section of the population there has always been a pure domestic life, and that the profligacy of the second empire has now ceased to exist.

See the guidebooks of Murray, Baedeker, Joanne, and topographical works by Du Camp (7th ed. 6 vols. 1884), Colin (1885), Pontich (1884), and the official *Annuaire Statistique* (since 1883); G. A. Sala, *Paris Herself Again* (1879); P. G. Hamerton, *Paris in Old and Present Times* (1884); Piton, *Comment Paris s'est Transformé: Histoire de Paris, Topographie, &c.* (1891); *Paris Guide par les principaux Écrivains et Artistes de la France* (introd. by Victor Hugo, and parts by Michelet, Louis Blanc, Renan, Sainte-Beuve, Taine, Quinet, Viollet-le-Duc, &c. (2 vols. 1867–68); Hoffbauer, *Paris à travers les Âges* (1890 *et seq.*); Lebeuf, *Histoire de la Ville et de la Diocèse de Paris* (15 vols. 1754; new ed. by Cocheris, 4 vols. 1863); Dulaure, *Histoire Civile, Physique, et Morale de Paris* (7 vols. 1821; new ed. by Leynadier, 1874); histories by De Gaulle (1840), Gabourd (1863–65), Arago (*Paris Moderne*, 2d ed. 1867); and the copious *Histoire Générale de la Ville de Paris*, issued, since 1866, by the municipal authorities; also histories of the university, in the middle ages by Budinsaky (Berlin, 1876), and in the 17th and 18th centuries by Jourdain (Paris, 1862–66). Some account of the siege of Paris in 1870–71 is given at FRANCE, Vol. IV. p. 783. See also Du Camp, *Les Convulsions de Paris* (1878–79); Morin, *Histoire Critique de la Commune* (1871); Vinoy, *Siège de Paris* (1872); Viollet-le-Duc, *Mémoire sur la Defense de Paris* (1872). And on Paris generally, see Lacombe, *Bibliographie de Paris* (1886).

DECLARATION OF PARIS.—In 1856 the representatives of the Powers agreed to four points in International Law (q.v.)—viz. (1) Privateering is abolished; (2) the neutral flag covers enemies' goods, excepting Contraband of War (q.v.); (3) neutral goods, with the same exception, are not liable to be seized even under an enemy's flag; (4) blockades, in order to be binding, must be effective. The United States refused to accept the first point, because the European powers declined to affirm that thereafter all private property should be exempted from capture by ships of war. See NEUTRALITY.

TREATIES OF PARIS.—The Peace of Paris of 1763 terminated the Seven Years' War (q.v.); fixed the territorial relations of Germany, France, and Spain; gave to England the French colonies in America; and rearranged the possessions of France and England in the West Indies, India, and Africa. The Treaty of 1814, concluded by the Allies soon after the abdication of Napoleon, reduced France substantially to its old limits. That of 1815, after Waterloo, did so more completely, levied a heavy contribution towards the war expenses, and reconstituted the map of Europe on the old lines. The Treaty of 1856 concluded the Crimean War (q.v.). A Treaty of 1857 arranged relations between Britain and Persia.

Paris, (1) capital of Bourbon county, Kentucky, on Stoner Creek, 19 miles by rail NE. of Lexington. It contains a military institute, and manufactures whisky, flour, cordage, &c. Pop. (1890) 5505.—(2) Capital of Lamar county, Texas, 98 miles by rail NE. of Dallas. It has manufactories of brooms, furniture, sashes, wagons, ploughs, &c. Pop. (1890) 8258.

Paris, a genus of plants of the small endogenous natural order Trilliaceæ, of which one species, *P. quadrifolia*, called Herb Paris, is not uncommon in moist, shady woods in some parts of Britain. It

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is rarely more than a foot high, with one whorl of generally four leaves, and a solitary flower on the top of the stem, followed by a berry. The berry is reputed narcotic and poisonous, but its juice has been employed to cure inflammation of the eyes. The root has been used as an emetic.

Paris, also called ALEXANDER, was, according to Homer, the second son of Priam and Hecuba, sovereigns of Troy. His mother dreamed during her pregnancy that she gave birth to a firebrand, which set the whole city on fire, a dream interpreted by Æsacus or Cassandra to signify that Paris should originate a war which should end in the destruction of his native city. To prevent its realisation Priam caused the infant to be exposed upon Mount Ida by a shepherd named Agelaus, who found him five days after alive and well, a she-bear having given him suck. Agelaus brought him up as his own son, and he became a shepherd on Mount Ida. An accident having revealed his parentage, old Priam became reconciled to his son, who married Œnone, daughter of a river-god. But his mother's dream was to come true for all that. He was appealed to, as umpire, in a strife which had arisen among the three goddesses, Hera (Juno), Athene (Minerva), and Aphrodite (Venus), as to which of them was the most beautiful, the goddess Eris (Strife) having revengefully flung among them, at a feast to which she had not been invited, a golden apple (of discord) inscribed 'To the Most Beautiful.' Each of the three endeavoured to bribe him. Hera promised him dominion and wealth; Athene, military renown and wisdom; Aphrodite, the fairest of women for his wife—to wit, Helen, the wife of King Menelaus. Paris decided in favour of Aphrodite—hence the animosity which the other two goddesses displayed against the Trojans in the war that followed. Paris now carried Helen away from Lacedæmon in her husband's absence. 'The rape of Helen' is the legendary cause of the Trojan war (see HELEN, TROY). Paris deceitfully slew Achilles in the temple of Apollo. He was himself wounded by a poisoned arrow, and went to Mount Ida to be cured by Œnone; but she avenged herself for his unfaithfulness to her by refusing to assist him, and he returned to Troy to die. He was often represented in ancient works of art, generally as a beardless youth of somewhat effeminate beauty.

Paris, COMTE DE. See BOURBON, ORLEANS.

Paris, MATTHEW, the best Latin chronicler of the 13th century, was born about the year 1200, and most probably took the name from his father before him, although he may have owed it either to his having been born at Paris, or to his having studied there. Certain it is he cannot have been a Frenchman, for in patriotic feeling he is thoroughly English. In January 1217 he entered the Benedictine monastery of St Albans, and grew up under the eye of Roger de Wendover, was present along with his prior at the nuptials of Henry III. and Eleanor of Provence (1247), and next year was sent by the pope's recommendation on a mission to repair the financial disorders in the Benedictine monastery on Monk's Island (Holm) near Trondhjem in Norway. In July 1251 he was in attendance at the court at Winchester, six months later he witnessed the marriage at York of Henry's daughter to Alexander III. of Scotland, and in March 1257 he had much conversation with the king during his week's visit to the monastery. His death occurred about the middle of 1259. Matthew Paris's principal work is his *Historia Major*, or *Chronica Majora*, a history from the creation down to the year 1259. The original edition is that published in 1571 under the authority of Archbishop Parker; but the authoritative edition of the work is that edited by Dr Luard in the Rolls series (7 vols. 1872–83). His conclusion as to its authorship is that down to the year 1189 it was the work of John de Cella, abbot of St Albans from 1195 to 1214; that from that point it was continued by Roger of Wendover down to the year 1235—the whole work to this point being often ascribed to him alone, and known as the *Flores Historiarum;* that Matthew of Paris next transcribed, corrected, and extended (by *interpretation* rather than *interpolation*) the work, which, moreover, from 1235 down to 1259 is entirely his own. As a historian he is vigorous, vivid, and accurate, and his pages are aglow with patriotic fervour. His *Historia Anglorum* is abridged from the greater work by the omission of what relates to foreign affairs. It was edited by Sir F. Madden in the Rolls series (3 vols. 1866–69). Other works are the *Abbreviatio Chronicorum* (1100–1255); *Liber Additamentorum* or *Supplementorum;* the dubious *Duorum Offarum Merciorum Regum Vitæ;* and the valuable *Viginti trium Abbatum S. Albani Vitæ.* See an article by Dr Jessopp in the *Quarterly Review* (1886).

Paris, PLASTER OF. See GYPSUM, STUCCO.

Paris Basin, in Geology, the area in which the Cainozoic systems of France are best developed. See EOCENE SYSTEM.

Paris Bordone. See BORDONE.

Parish (Lat. *parochia;* Gr. *paroikia,* 'neighbourhood') is a term used to denote the district assigned to a bishop or priest. In early times the bishop arranged all the church work of his diocese, and the minor churches were served by clergy sent from the bishop's church. Where the church was established and endowed parishes were assigned to resident priests, and tithes were, by special gift or by general rules of law, made payable to the parson of the parish. In England provisions relating to this matter were included among the laws of Edgar about 970. Parishes were formed on the basis of previously existing manors and townships; the lord of the manor often held the Advowson (q.v.) or patronage of the parish church; and the inhabitants held their meetings in the vestry of the church; the parson presided, and he was usually permitted to nominate one of the Churchwardens (q.v.). The parish was originally the unit of administration for poor-law and highway purposes, but modern legislation has transferred many of the functions of parish authorities to Boards of Guardians (see POOR-LAWS) Highway Boards (see ROADS), and County Councils (q.v.). There are about 15,000 civil parishes in England and 900 in Scotland; they vary very widely both in extent and in population. Thus, Queensferry has an area of only 11 acres, Kilmallie (pop. 4157) in Lochaber of 444 sq. m. (nearly as large as Bedfordshire); whilst Whalley in Lancashire (180 sq. m.) has more than 250,000 inhabitants, and Skiddaw (nearly 5 sq. m.) in Cumberland only 10. The boundaries of an ancient parish are fixed by custom, the memory whereof was formerly, and in some cases is still, kept alive by an annual or periodical perambulation (see BOUNDS, BEATING THE). Ancient parishes have been divided and altered in many cases in the exercise of statutory powers; the Local Government Board possesses large powers of alteration. For ecclesiastical purposes populous parishes may be divided and new vicarages constituted by the Ecclesiastical Commissioners; by the exercise of these powers the number of ecclesiastical parishes has been raised to about 13,000. Extra-parochial places, and places formerly described as 'parishes by repute only,' are now represented on Boards of Guardians and rated for local purposes. The system of plural voting in parish meetings is established by an act passed in

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1819; all persons paying poor-rates may vote; the number of votes varies with the value of premises occupied; but no person has more than six votes.

The vestry of a parish is either a common vestry —i.e. a meeting of all the ratepaying inhabitants, presided over by the incumbent—or a select vestry, elected under Hobhouse's Act, which was passed in 1831, or under some local act or special custom. There are some politicians who think that legislation has gone too far in transferring administrative powers from parishes to counties and unions; and it is suggested that the Local Government Act of 1888 should be supplemented by an act establishing parish councils with rather extensive powers. The inhabitants of many districts are strongly attached to their existing institutions, and it would not be easy to frame a measure of reform which would be acceptable in all parts of the country. Among parish officers and authorities we include the incumbent, who is usually styled rector or vicar (see the article TITHE). The parson —i.e. person—of a parish is a corporation sole; he has a freehold in his office, and in the church and churchyard, subject to the rules of ecclesiastical law and the rights of the parishioners. The church is used only for the services of the Church of England; the churchyard may be used by Nonconformists, in accordance with the provisions of the Burials Act of 1880. The Churchwardens (q.v.) are elected annually in Easter week; they take care of the church and its furniture, find seats for parishioners attending the services, and usually administer the local charities. Some writers assert that the practice of permitting the incumbent to name a churchwarden is only a courtesy, not a binding custom; but there seems to be no legal decision on the point. Overseers are appointed annually by the local justices, to act along with the churchwardens in administering the poor-law. The care of the poor is now almost entirely transferred to the guardians, but by modern acts of parliament, duties of an extremely miscellaneous character are imposed on overseers. They assist the guardians by keeping registers of persons receiving relief, &c.; and they prepare lists of jurymen, parliamentary voters, &c. A woman may be an overseer. 'Allotment wardens' may be appointed under several acts; but in many places allotment lands are managed by the minister and churchwardens. Parish constables are still appointed in some places, but they are generally superseded by the county police. The poor-rate is used as a general rate, out of which the expenses of local authorities are paid; church-rates are still collected in many parishes, but since 1869 they cannot be levied by compulsory process, and are therefore to be regarded rather as subscriptions than as rates.

In Scotland the ecclesiastical parishes are of very ancient date. The Court of Session, acting as the Commission of Teinds, has power to unite and divide parishes, and to erect a disjoined part into a parish *quoad sacra*—i.e. for ecclesiastical purposes only. Endowed Gaelic congregations in the great towns of the Lowlands may be made parishes *quoad sacra*. The poor-law was formerly administered by the kirk-session in county parishes and by magistrates in burghal parishes; but an Act of 1845 introduced a system of parochial boards, under the general control of the Board of Supervision. The Board may unite two or more parishes for poor-law purposes. The church fabric is supported by the heritors; and highways are not repaired by the parish. There are therefore no churchwardens or way-wardens in Scotland; nor is there any meeting corresponding to the vestry. In the matter of parish schools Scotland was formerly far in advance of England; the policy of the Education Acts is now the same in both countries.

In the United States the term parish is not uncommonly used to denote the district assigned to a church or minister, but there are no civil parishes, except in the state of Louisiana.

See Wright and Hobhouse, *Local Government;* and, for the ecclesiastical part of the subject, Lord Selborne on *Churches and Tithes.*

Parish Clerk. See CLERK.

Park, MUNGO, the African traveller, was born 10th September 1771, at Foulshiels on the Yarrow, a farmer's seventh child in a family of thirteen. Educated at Selkirk, he was apprenticed to Dr Thomas Anderson, a surgeon there, and afterwards studied medicine in Edinburgh (1789–91). He was then introduced to Sir Joseph Banks by his brother-in-law, James Dickson, botanist, and obtained the situation of assistant-surgeon in the *Worcester,* bound for Bencoolen in Sumatra. On his return in 1793, the African Association of London had received intelligence of the death of Major Houghton, who had undertaken a journey to Africa at their expense. Park offered his services, was accepted, and sailed from England 22d May 1795. He spent some months at the English factory of Pisania on the Gambia in making preparations for his travels, and in learning the Mandingo language. Leaving Pisania on the 2d of December he travelled eastward; but when he had nearly reached the place where Houghton lost his life, he fell into the hands of a Moorish king, who imprisoned him, and treated him roughly. Park seized an opportunity of escaping (1st July 1796), and in the third week of his flight reached the Niger, the great object of his search, at Sego, in 13° 5′ N. lat. He followed its course downward as far as Silla; but meeting with hindrances that compelled him to retrace his steps, he pursued his way westward along its banks to Bammaku, and then crossed a mountainous country till he came to Kamalia, in the kingdom of Mandingo (14th September), where he was taken ill, and lay for some time. A slave-trader at last conveyed him again to the English factory on the Gambia, where he arrived, 10th June 1797, after an absence of nineteen months. Bryan Edwards drew up an account of his journey for the Association, and Park published an account of his travels after his return, under the title of *Travels in the Interior of Africa* (1799), a work which at once acquired a high popularity. He now married a daughter of Dr Anderson, his old Selkirk friend (2d August 1799), and settled as a surgeon at Peebles, where, however, he did not feel at home. He told Scott that he would rather brave Africa and its horrors than wear his life out in toilsome rides amongst the hills for the scanty remuneration of a country surgeon; and so, in 1805, he undertook another journey to Africa at the expense of government. As he parted from Scott on Williamhope ridge, his horse stumbled: 'I am afraid, Mungo,' said Scott, 'that is a bad omen.' To which Park replied with a smile, '*Freits* (omens) follow those who look to them.' When he started from Pisania he had a company of forty-five, of whom thirty-six were European soldiers; but when he reached the Niger in August his attendants were reduced to seven. From Sansanding on the Niger, in the kingdom of Bambarra, he sent back his journals and letters in November 1805 to the Gambia, and embarked in an unwieldy half-rotten canoe with four European companions. Through many perils and difficulties they reached Boussa, where the canoe was caught in a cleft of rock; they were attacked by the natives, and drowned as they attempted to escape. An account of Park's second journey was published at London in 1815. Mrs Park was in receipt of a government pension till

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her death in 1840. Two of Park's sons joined the Indian army; Thomas, the second son, perished in trying to penetrate the mystery of his father's death. Park's narratives, which are well written, have long held their place amongst the classics of travel, and are of no inconsiderable value, particularly for the light which they throw upon the social and domestic life of the negroes, and on the botany and meteorology of the regions through which he passed; but he was unfortunately cut off before he had achieved the grand aim of his explorations—the discovery of the course of the Niger (q.v.). Park was tall and robust, and possessed of great hardihood and muscular vigour. 'For actual hardships undergone,' writes Joseph Thomson, 'for dangers faced, and difficulties overcome, together with an exhibition of the virtues which make a man great in the rude battle of life, Mungo Park stands without a rival.'

See the Life by Wishaw, prefixed to *Journal* (1815), and Joseph Thomson's *Mungo Park* (1890).

Parker, SIR HYDE (1739-1807), a British admiral, of a Devonshire family distinguished both before and after him in the naval service of the country, served in the American war and in the West Indies, and in 1801 was appointed to the chief command of the fleet which was sent to the Baltic to act against the armed coalition of the three northern states of Russia, Sweden, and Denmark. He had no share in the battle of Copenhagen, in which Nelson engaged contrary to his orders; but by his appearance before Carlskrona he compelled the neutrality of Sweden; and he was on the point of sailing for Cronstadt when the news of the Emperor Paul's death put an end to hostilities.

Parker, JOSEPH, a popular preacher and author, the son of a stone-cutter, was born at Hexham, 9th April 1830, and like Spurgeon began to preach in early youth. He studied at Moorfields Tabernacle and University College, London (1852), was ordained pastor of the Congregational Church, Banbury (1853), and became minister of the Cavendish Street Church, Manchester (1858), and of Poultry Chapel, London (1869), now City Temple (opened 1874). He visited the United States in 1888, and received the degree of D.D. from Chicago University. As a preacher he is strong and vigorous, with a splendid command of racy English; he has not unfrequently posed as an oracle on political and ecclesiastical subjects.

He has published *Helps to Truth-seekers* (1857), controversial discourses with secularists at open-air meetings; *Ecce Deus* (1868; 5th ed. 1875), being a reply to *Ecce Homo; Ad Clerum* (1870); *City Temple Sermons* (1869-70); *Inner Life of Christ* (1881-82); *Apostolic Life* (3 vols. 1884); *People's Prayer-book* (1889); but his most ambitious work is his *People's Bible*, 'discourses upon Holy Scripture, forming a pastoral commentary,' of which the first volume, *Genesis*, appeared in 1885. See *Tyne Chylde: My Life and Teaching* (new ed. 1889).

Parker, MATTHEW, the second Protestant Archbishop of Canterbury, was born son of a calenderer at Norwich, August 6, 1504, studied at St Mary's Hostel and Corpus Christi College, Cambridge, took orders, and was elected to a fellowship. He was an arduous student of the Scriptures and of church history, yet, in spite of his strong leaning to the past, from an early period he was infected by the new doctrines. In 1535 he was appointed chaplain to the queen Anne Boleyn, and soon after he obtained the deanery of the college of St John the Baptist at Stoke near Clare in Suffolk. Here he lived mainly till 1545, his retiring temper finding pleasure enough in his studies and the administration of the college. In 1538 he was created D.D., next a royal chaplain and canon of Ely, and in 1544 master of Corpus Christi College, Cambridge, and the year after vice-chancellor of the university. Two years later he married. He was presented by Edward VI. to the deanery of Lincoln and the prebend of Corringham, but on the accession of Mary he resigned his mastership and was deprived of his preferments, finding safety, however, in strict retirement. The accession of Elizabeth called him from his retirement, and he was consecrated Archbishop of Canterbury in the chapel at Lambeth, December 17, 1559. The ridiculous fable about the informality of the ceremony is discussed under the head of the Nag's Head Consecration.

During his fifteen years' primacy Parker strove to define more clearly the limits of belief and discipline, and to bring about more general conformity. The Thirty-nine Articles were passed by convocation in 1562, and four years later the archbishop issued his 'Advertisements' for the regulation of service, which, with the measures of repression perhaps forced upon him by the imperious queen, provoked great opposition in the ranks of the growing Puritan party. To Parker belongs the merit of originating the revised translation of the Scriptures known as the Bishops' Bible. His wife died in August 1570. Her on one occasion Elizabeth insulted at Lambeth with the words, '*Madam* I may not call you, and *mistress* I am loath to call you: however, I thank you for your good cheer.' Parker died 17th May 1575.

Parker did much for our native annals, but his methods as an editor have not commended themselves to modern scholars. He edited Ælfric's *Anglo-Saxon Homily*, to prove that transubstantiation was not the doctrine of the ancient English church; the *Flores Historiarum*, as the work of an assumed Matthew of Westminster; the *Historia Major* of Matthew Paris, the *Historia Anglicana* of Walsingham. Asser's *Gesta Ælfredi*, and the *Itinerarium* of Giraldus Cambrensis. The *De Excidio Britanniæ* of Gildas was edited under his eye by Josselin. He was an indefatigable collector of books, and the greater part of the treasures he had amassed he bequeathed to Corpus Christi College. This collection Fuller called 'the sun of English antiquity before it was eclipsed by that of Sir Robert Cotton.' Parker established a *scriptorium* at Lambeth, where he maintained printers, transcribers, engravers. His original writings are inconsiderable, the chief being a Latin treatise, *De Antiquitate Britannicæ Ecclesiæ et Privilegiis Ecclesiæ Cantuariensis* (1572). His letters fill a volume (1853) in the publications of the Parker Society, a fitting memorial of the book-loving archbishop. The Society published from 1841 till its dissolution in 1853 as many as fifty-three volumes of the works of Ridley, Bull, Grindal, Hooper, Cranmer, Coverdale, Latimer, Jewel, Tyndale, Bullinger, Whitgift, Rogers, and other fathers of the English Reformation. For Parker's life, see the *Life and Acts* by Strype (3 vols. Oxford, 1824); also Hook's *Lives of the Archbishops of Canterbury*, vol. ix. (1872).

Parker, THEODORE, a great American preacher, was born at Lexington, Massachusetts, August 24, 1810. His grandfather held a command at Lexington, his father was an intelligent Unitarian farmer and wheelwright. He graduated at the Divinity School at Harvard in 1836, and settled the year after as Unitarian minister at West Roxbury, now a part of Boston. The naturalistic or rationalistic views which separated him from the more conservative portion of the Unitarians first attracted wide notice in an ordination sermon on *The Transient and Permanent in Christianity* (1841). The contest which arose on the anti-supernaturalism of this discourse led him to further develop his theological views in five Boston lectures, published under the title of *A Discourse of Matters pertaining to Religion* (1841), which was followed by *Sermons for the Times*. Failing health induced him to make an extended tour in Europe. In 1844 he returned to America, and for the remainder of his life preached to a

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congregation of three thousand at the Melodeon and Music Hall, besides incessantly writing for the press on social and theological questions. He lectured also throughout the States, and plunged with characteristic enthusiasm into the anti-slavery agitation. In the midst of his work he was attacked in 1859 with bleeding from the lungs, and made a voyage to Mexico, whence he sailed to Italy, only to die at Florence, May 10, 1860. His lectures, sermons, and miscellaneous writings have been collected and published in America and England, and reveal vast learning, keen spiritual insight, with great force of argument and felicity of illustration. Yet the thought is neither clearly defined, profound, nor always self-consistent, while the form is usually far inferior to the content.

The English edition of his works was edited by Frances P. Cobbe (12 vols. 1863 *et seq.*). There are Lives by Weiss (2 vols. Boston, 1864), Frothingham (New York, 1874), Dean (Lond. 1877), and Frances E. Cooke (3d ed. Boston, 1889). See also vol. i. of Martineau's *Essays, Reviews, and Addresses* (1890).

Parkersburg, capital of Wood county, West Virginia, on the Ohio River (here crossed by a railway bridge 1⅛ mile long), at the mouth of the Little Kanawha, 195 miles by rail E. by N. of Cincinnati. The city has a large trade in petroleum, and contains five great oil-refineries, besides chemical works, lumber-mills, and manufactories of furniture, barrels, &c. Pop. 8582.

Parkes, Sir Henry, K.C.M.G., an Australian statesman, was born the son of a yeoman at Stoneleigh, Warwickshire, in 1815, emigrated to New South Wales in 1839, and at Sydney became eminent as a journalist, editing *The Empire* from 1849 to 1856. A member of the colonial parliament in 1854, he held various government offices and became prime-minister in 1872. He has since been several times head of the ministry, and has been identified with the promotion of free trade. He was the representative of New South Wales at the Colonial conference in London in 1887, and in 1891 was president of the council for arranging a federal union of the Australian colonies.

Parkesine. See Celluloid.

Parkhurst, John, an English biblical scholar, was born at Catesby in Northamptonshire in June 1728. He was educated at Rugby and at Clare Hall, Cambridge, and took orders, but soon after retired to his estate at Epsom to give himself to study. Here he died, March 21, 1797. In 1762 appeared his principal work, *A Hebrew and English Lexicon, without Points,* a very creditable performance for its time, and long a standard work, although disfigured by its fanciful etymologies. Of course it is now entirely superseded. Parkhurst also wrote a treatise (1787) against Dr Priestley, to prove the divinity and pre-existence of Jesus Christ.

Parkman, Francis, historian, was born in Boston, Massachusetts, 16th September 1823, graduated at Harvard in 1844, next studied law for two years, then travelled in Europe, and returned to explore the Rocky Mountains. The hardships he endured among the Dakota Indians seriously injured his health, yet in spite of this and defective sight Parkman has worked his way to recognition as a historical writer on the period of rise and fall of the French dominion in America. He has paid many visits to France to examine archives. His books are *The California and Oregon Trail* (1849), *The Conspiracy of Pontiac* (1851), *Pioneers of France in the New World* (1865), *The Book of Roses* (1866), *Jesuits in North America* (1867), *Discovery of the Great West* (1869), *The Old Régime in Canada* (1874), *Count Frontenac and New France under Louis XIV.* (1877), and *Montcalm and Wolfe* (1884).

Parlement, the name applied in France, down to the Revolution, to certain superior and final courts of judicature, in which also the edicts of the king were registered before they became laws. Of these the chief was that of Paris, but there were no fewer than twelve provincial parlements, at Toulouse, Grenoble, Bordeaux, Dijon, Pau, Metz, Besançon, Douai, Rouen, Aix, Rennes, and Nancy. These, though not actually connected with that of Paris, invariably made common cause with it in its struggles with the royal power. The parlement of Paris dated from the 14th century, and already consisted of three chambers, the Grand Chambre, the Chambre des Enquêtes, and the Chambre des Requêtes. By 1344 it had grown in numbers and power, and consisted of 3 presidents and 78 counsellors, of whom 44 were ecclesiastics and 34 laymen. In 1467 Louis XI. made the counsellors irremovable. Its influence grew during the 16th century, and it now began to find courage to deliberate on the royal edicts as well as merely register them, which the king could always force them to do by coming in person and holding a 'lit de justice' (see Bed of Justice). Neither Richelieu nor Louis XIV. permitted such discussion of their edicts, and both the Regent Orleans and Louis XV. followed their policy. The latter exiled the members from Paris in 1753 for their interference in the struggle between the Jansenists and the Jesuits, and in 1770, on the advice of Maupeou, abolished the old parlement altogether and established the Parlement Maupeou. Louis XVI., however, recalled the former counsellors. These in the last days of their existence were grouped as follows: The Grand Chambre, with 10 presidents and 37 counsellors, of whom 12 were clerics; the three Chambres des Enquêtes, each formed by 2 presidents and 23 counsellors; and the Chambre des Requêtes, in which sat 2 presidents and 13 counsellors.

Parley, Peter. See Goodrich.

Parliament (Low Lat. *parliamentum* or *parlamentum;* Fr. *parlement,* from *parler,* 'to talk'), a meeting for conference and discussion (see Parlement). In England the name of parliament has been given since the 13th century to the Great Council of the realm—the national assembly which succeeded to the powers exercised by the Witenagemote in Anglo-Saxon times. Under the influence of feudal ideas the Great Council became the high court of parliament. As the manor had its courts in which the lord met with his tenants, so the kingdom had its high court, in which the king met with the different estates or orders of his subjects, and conferred with them as to the enforcement of the good customs of the realm. At first the king claimed to exercise a measure of arbitrary discretion in issuing his writs of summons to parliament; but before the end of the 13th century it was settled and clearly understood that parliament should always consist of duly qualified representatives of the three estates of the realm—the Clergy, the Lords, and the Commons. The notion that the three estates are King or Queen, Lords, and Commons is a modern misconception.

The Three Estates—The Clergy.—The clergy were represented by the Lords Spiritual, the bishops, who sat among the Lords by virtue of their office. At one time proctors representing the lesser clergy sat among the Commons; but the clergy gave up this right in order to manage their own affairs in Convocation (q.v.). When Convocation gave up its right of taxation clergymen were permitted to vote in the election of members of the House of Commons. It would hardly be correct to say that the

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clergy still form a separate estate; but the Lords Spiritual still sit in the Upper House. The Archbishops of Canterbury and York, and the Bishops of London, Durham, and Winchester are always summoned to parliament; the other bishops are also summoned, but the junior members of the episcopal bench are excluded by the acts for the creation of new bishoprics, in which it is provided that the number of Lords Spiritual is not to be increased beyond the number as it stood in 1846, when the see of Manchester was founded. The Lords Spiritual do not vote as a separate order; in other words, a bill may pass in the House of Lords though all the bishops vote against it.

The Lords Temporal.—The lords or greater barons were originally those who held lands and honours of the king by the more dignified kinds of feudal service. They were barons by tenure, and as such entitled to receive the king's writ; among themselves they were peers or equals. In course of time the writ became the evidence of title to a peerage; but since the 15th century peers have always been created by a patent from the crown, specifying the title by which the new peer is to be known, and the heirs to whom his dignity is to descend. The titles now in use are duke, marquis, earl, viscount, and baron (on which see separate articles); a peer is named as being of a particular place, but it is no longer necessary that he should have any land or feudal rights in the place named. In other words, our aristocracy is no longer a close feudal aristocracy; it owes its existence to the crown, and the crown may increase the number of peers at pleasure. This is a very important rule, for the right to create new peers enables the crown—i.e. the ministers governing in the name of the crown, and enjoying the confidence of the House of Commons—to overcome the resistance of the House of Lords. Of late years the mere threat to create new peers has been found sufficient, as may be seen on referring to the history of the Reform Act of 1832. The dignity of peerage was always a hereditary dignity; the blood of the holder was ennobled. But the sons of a peer, though they bear courtesy titles and are nominally ennobled, are commoners for all legal and political purposes. This again is a most important rule, because it prevents the nobility from becoming a closely organised caste. It seems that the crown could always create a man a peer for his life; but it was resolved in the case of Lord Wensleydale, in 1856, that a life peerage, even if followed up by a writ of summons to parliament, would not entitle the holder to sit in the House of Lords. Since the Wensleydale case the Lords of Appeal, appointed to take part in the judicial business of the House, have been made life peers by statute. In 1830 there were 401 peers on the roll of the House of Lords; in 1890, 551, 12 being minors. Of these peerages 193, or rather more than one-third, have been created since the beginning of the 19th century.

In ancient times the prerogative right to create peers was used but sparingly; there were only some 50 or 60 Lords Temporal in the parliaments of the 15th and 16th centuries. The number of Lords Spiritual was reduced by the removal of abbots and priors at the Reformation to 26, and has not since been increased. Four sat as representatives of the Irish Church from 1800 down to its disestablishment in 1869. In conferring peerages the Stuart kings were more generous, or more lax than their predecessors. At the Revolution of 1688 the number stood at about 150. On the accession of George I. the leaders of the House of Lords proposed to restrain the crown from adding to the then existing number of 178 peerages; but this scheme was vehemently opposed in the House of Commons, and finally rejected. During the reign of George III. peers were created very freely. It was the avowed policy of the younger Pitt to fill the House of Lords with the wealthiest traders and landowners, and so to break down the family and personal factions into which a small aristocratic assembly tends to divide itself. With this object he conferred peerages so lavishly that the number created by George III. was 388.

In 1399 the Commons formally admitted 'that the judgments of parliament belong to the Lords and not to the Commons.' The House of Lords is a court of final appeal for all parts of the United Kingdom; it exercises original jurisdiction in peerage cases, in trials of peers for treason or felony, and on Impeachments (q.v.) by the Commons. When the House is sitting judicially only those members who hold or have held high judicial office take part in the proceedings. Lay peers formerly took part and voted on appeals; but this practice was justly regarded as a scandal. In 1844 some lay peers announced their intention to vote in the case of the Queen *v.* Daniel O'Connell, but they were persuaded to retire, and the case was decided by the legal members of the House. In its legislative capacity the House may deal with any matter affecting the public interest, and it claims the right to initiate bills which directly affect its own rights and privileges. By a convention of long standing, the Lords respect the right of the Commons to initiate money bills; they may accept or reject a money bill, but they do not amend it in detail. Any member of the House may introduce a bill, and ask that it may be read a first time; the 'reading' is of a formal character—the bill is laid on the table, and the title is read out by the clerk. If the House consents to read the bill a second time it accepts the general principle of the measure; the bill is then referred to a committee of the whole House, or to a select committee, to be amended in detail; it may then be reported to the House and read a third time and passed. If the bill is afterwards passed, or has already been passed by the Commons, it only requires the royal assent to become an act of parliament. This assent is given by the sovereign in person, or by commissioners representing the sovereign; the Lords are present in their places; the Commons, headed by their Speaker, attend at the bar of the Lords; the clerk of parliaments utters the Norman-French formula, 'Le Roy (or La Reine) le veult.' In the case of a money bill the royal assent is coupled with an expression of thanks for the 'benevolence' of parliament. The clerk endorses on the bill the date of the royal assent which turns it into an act. If the sovereign were to refuse assent the form would be 'Le Roy (or La Reine) s'avisera'—the King (or Queen) will think about it. But since the cabinet council became the chief power in the state this form of refusal has never been heard. Ministers take the lead in the business of legislation; they obtain the assent of the sovereign on the one hand, and of parliament on the other; all open conflict of powers is avoided. Queen Anne refused her assent to a Scotch Militia Bill; but since that time the royal assent has been given to every bill which passed the two Houses. Bills which await the royal assent are usually deposited in the House of Lords for that purpose; but a money bill, after passing the Lords, is returned to the Speaker of the Commons, and is brought by him to the bar of the Lords to receive the royal assent.

Precedence and Privileges.—Members of the House of Lords were formerly required to sit according to their precedence, but this rule is no longer observed. The bishops sit to the right of the woolsack; on the same side is the bench usually

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occupied by ministers. Supporters of the government sit behind their leaders, members of the opposition on the other side of the House, and independent members on the cross benches in front of the table. Whether it is sitting as a legislative or a judicial body, the House of Lords possesses all privileges necessary to the safe and dignified conduct of business. Its members are free from arrest on civil process in coming, going, or returning. They are free to speak their minds without being liable to action or indictment. They have access to the crown to explain their proceedings, and the crown should put the best construction on what they do. It is a breach of privilege to reflect on the honour of the House, or on the parliamentary conduct of its members. It is technically a breach of privilege to report its proceedings; but regular arrangements are now made for the admission of reporters. It was formerly doubtful how far the printers of the House were protected, but now, under an Act of 1840, the printers of parliamentary papers, if sued or prosecuted, may obtain a stay of proceedings on producing a certificate that such papers were printed by order. The House of Lords declares its own privileges; but in doing so it is bound by the law; it cannot create a new privilege by mere declaration. Persons guilty of breach of privilege may be attached and brought in custody, censured, fined, or imprisoned for a time certain or during pleasure. The privilege of the House may be used to protect the House and its committees, and all persons having lawful business before them, together with their counsel, solicitors, and witnesses.

Officers.—The chief officer of the House of Lords is the Chancellor, or Keeper of the Great Seal, who acts as speaker for formal purposes; he does not keep order; the Lords keep their own order. It is not even necessary that he should be a lord of parliament, and he sits on the woolsack, which is supposed to be outside the House. Deputy-speakers are appointed when necessary; and there is a salaried Chairman of Committees who exercises considerable powers, especially in regard to private bills. The Clerk of Parliaments is appointed by the crown; and the Gentleman Usher of the Black Rod is one of the Queen's ushers, whom she permits to act as the messenger and executive officer of the Lords. The judges and law-officers rank as assistants of the House; they are summoned to attend in parliament, and they are present on occasions of state; the judges also come in and sit together on the woolsack when the Lords desire to take their opinions on a point of law. Formal messages to the Commons are conveyed by the Usher of the Black Rod. Judges and Masters in Chancery were formerly employed for the same purpose, but the Commons came to treat these ceremonious messages with levity, and messages now pass from one House to another by the hands of their respective clerks, except on certain important occasions, such as the opening of parliament, &c. Formerly, when the two Houses differed, a formal conference was held in the Painted Chamber, the Lords sitting with their hats on, the Commons standing and uncovered; but the modern practice of party government renders these conferences unnecessary.

The Commons.—The Commons, or 'communitas regni,' included originally three classes of persons. First, the proctors of the lesser clergy, who disappeared at an early date. Secondly, the knights of the shire, who were chosen by the lesser barons and the general body of freeholders. These free tenants held their land by honourable tenures, but they could not bear the expense of attendance in parliament. As early as the time of King John they were represented by delegates; and Simon de Montfort gave effect to the same principle when he ordered two knights to be sent to parliament from each shire. Thirdly, there were burgesses and citizens, representing the self-governing towns of the kingdom. The burgesses also found it hard to bear the expense of attending parliament; they usually received an allowance for doing so; and some legal authorities have held that a member may still recover his 'wages' if he chooses to sue for them. No member of parliament now receives any pecuniary allowance. Payment of members is often advocated on the ground that the labouring population ought to be represented by men of their own class; it is resisted on the ground that paid members would be officials or delegates, not free representatives of the general body of citizens.

Happily for the cause of popular government, the knights and burgesses were soon welded together in one body; there has never been any legal difference between county members and borough members. Early in the history of parliament (the date cannot be exactly determined) the Commons retired to consider their own affairs in a separate chamber; one of their number presided, and acted as Speaker in communicating to the Lords the opinions of the third estate; and thus the Commons came to be organised as a separate House. The Lords remained in the old parliament chamber, and there the king continued to meet with the three estates; his throne was set in the House of Lords, and he never went into the House of Commons. Charles I. was therefore acting contrary to usage when he went in person to arrest the seven members. From about 1548 the Commons met in a room which had been known as St Stephen's Chapel, and the House is still occasionally spoken of as St Stephen's. Within the House all members are equal; but the bench immediately to the right of the chair is reserved for privy-councillors, and is now always occupied by ministers having seats in the House: their supporters sit behind them, and the members of the opposition sit to the left of the chair. Like the members of the other House, the Commons enjoy privilege of parliament; they are free from arrest on civil process in attending the House, and in coming or returning; but no person is privileged against arrest for crime or contempt of court. In the days when arrest for debt was common the privilege claimed by members of parliament, and even by their servants, was sometimes used to defeat creditors; but now an action or a bankruptcy petition is in no way impeded by privilege. A member of either House who becomes bankrupt is not permitted to sit or vote. Freedom of speech is enjoyed by the Commons as by the Lords; and they may claim, as a House, free access to the sovereign. The Commons may deal with offenders against their privileges by directing a prosecution; they do not claim the right to impose a fine, or to imprison for a time certain, but they may commit a person to prison during pleasure; persons so imprisoned may not be detained after the end of the session. The House declares its own privileges, but it cannot create a new privilege by mere declaration. In the famous case of Stockdale *v.* Hansard the House assumed authority to protect its printer against an action for libel, but the courts disregarded this resolution, and the controversy was finally settled by the passing of the Act of 1840 which has already been cited. A question of privilege will be taken up without notice at any moment; but it should be observed that a member has no privilege except when he is performing his parliamentary duty. If, for instance, a member is arrested for a crime committed out of doors, no question of privilege arises. We have seen that the Commons claim no general judicial authority, but they have claimed to deal judicially

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with cases of privilege, and with questions relating to the election and conduct of their members. Election petitions used to be tried by committees of the House, but this practice led to great abuses, and in 1868 these petitions were remitted to the judges for trial. The House may exclude, suspend, or expel a member for misbehaviour; but it was settled in the case of John Wilkes (q.v.) that expulsion creates no disqualification; the person expelled may be re-elected. Burke and other high authorities attach great importance to this rule of the constitution. If the House could disqualify a member for re-election, the majority might be tempted to strengthen itself by expelling the leaders of the minority. In 1711 Sir Robert (then Mr) Walpole was expelled the House, and there is reason to believe that the vote in his case was decided by considerations of party, and not by his guilt or innocence of the charges made against him.

As representing the whole community, and not merely a limited order, the Commons have long been accustomed to take the lead in the financial and legislative business of parliament. Since the Great Charter the crown has frequently admitted that taxes are not to be levied without consent of parliament; and in the reign of Richard II., if not earlier, the Commons laid claim to the 'power of the purse.' It is now established beyond doubt that the Commons have an exclusive right to vote supplies of money, and to prescribe the ways and means by which money may be raised. This right is respected by the Lords; the last conflict between the Houses occurred in connection with the repeal of the paper duty in 1860. Estimates of public expenditure are laid before the Commons by ministers, and considered in committee of supply. This is a committee of the whole House; the Speaker leaves the chair when the committee begins; the Mace (q.v.) is taken from the table; the Chairman of Committees takes his seat at the table; and the discussion which follows is of an informal character, members being allowed to speak more than once to the same question. When some of the necessary votes have been taken in supply the House resolves itself, in like manner, into a committee of ways and means. The resolutions adopted in committee are embodied in bills, which are sent up for the assent of the Lords. At the close of the financial year (i.e. about the end of March) the Chancellor of the Exchequer, in committee of the whole House, opens his Budget (q.v.) of expenditure and revenue for the coming year. Legislative business is conducted with the same forms as in the Lords; but a member must ask leave of the House to introduce a bill. If a bill is read a second time it is considered in detail by a committee of the whole House, or by a select committee. A committee always reports its proceedings to the House, the Speaker resuming the chair for that purpose. Besides performing these financial and legislative duties, the House of Commons acts as a 'grand inquest' to inquire into all matters of public concern. It is specially bound to watch the conduct of ministers, and to inform the sovereign whether they possess the confidence of the nation or not. In other words, the support of the Commons is necessary to the existence of a ministry, while a ministry may hold power though its supporters are in a minority in the Lords. Ministers take the lead in all important business; and party discipline tends to reduce the individual private member to comparative insignificance.

Union with Scotland and Ireland—Parliamentary Reform—Democracy.—The functions of parliament have been rendered more important and difficult by the political changes of the last 200 years. In the first place there is now only one legislature for the United Kingdom. Down to 1707 Scotland had an independent parliament; the three estates of that kingdom sat together in one house, and the conduct of business was for the most part left to a smaller body called Lords of the Articles. At the Union the Scottish parliament ceased to exist; it was agreed that sixteen Scottish peers (elected by an assembly of peers at Holyrood, at the opening of a new parliament) should sit in the House of Lords, and not less than forty-five Scottish members in the House of Commons. The Irish parliament was an assembly of a more or less provincial character, sitting in two houses. Its legislative independence was conceded, under pressure, in 1782, but it never obtained effective control over the executive (see GRATTAN). By the Act of Union the Irish parliament was taken away; it was agreed that twenty-eight Irish peers (elected for life) should sit in the House of Lords, and 100 Irish members in the House of Commons. Thus the English parliament became the parliament of the United Kingdom. By the acts extending toleration to Roman Catholics (1829), Jews (1858), and Secularists—under the Oaths (q.v.) Act of 1888—new elements have been introduced into parliamentary life, and new questions have arisen for legislative treatment. Successive Reform acts have widened the democratic basis of the House of Commons: the Act of 1832 gave power into the hands of the middle classes; the Acts of 1867 and 1884, by admitting all householders and £10 lodgers to the franchise, have given a preponderance of voting power to the working-classes. One result of these successive changes is that the Commons are now 670 in number; they are, in fact, much too numerous for a deliberative assembly. The colonies and dependencies have no direct representation in either House; but questions of imperial policy occupy no small share of the time of parliament. With the advance of democracy, the sphere of legislation has been extended; large schemes for promoting education and sanitary reform, for regulating mines, factories, and shipping, and for the creation of new executive departments and local authorities are brought forward by all political parties. Each party makes its power felt by pushing its own measures and by dilatory resistance to the measures of its opponents; obstruction has been reduced to an art; the labours of those who lead the House of Commons have become intolerably heavy, and the old rules of debate are found unequal to the strain of political conflict. In 1882 the House adopted new rules of procedure, and these rules were further amended in 1887. A motion for the closure of a debate may now be put at any moment, with the assent of the Speaker or Chairman. But a question for the closure of debate is not decided in the affirmative unless it appears that the motion is supported by more than 200 members, or is opposed by less than 40 and supported by more than 100 members. Dilatory motions for adjournment have been checked; tedious and irrelevant speakers may now be stopped by the chair; a member 'named' to the House as disregarding the authority of the chair may be suspended for a time from his service.

Officers.—The chief officer of the House of Commons is the Speaker, who is chosen by the members from among their own number, at the opening of a new parliament. The Speaker-elect presents himself at the bar of the Lords for the approval of the crown, which is given in a customary form of words by the Lord Chancellor. The Speaker then lays claim to the ancient privileges of the Commons: on returning to his own House he takes the oath before the other members. Inducted with these forms, the Speaker becomes the president and spokesman of the House, with authority

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to keep order. He refers all questions of importance to the House; but his own position is one of great influence and dignity; he is the First Commoner in the kingdom, and takes precedence as such. The Chairman of Committees presides in committee of the whole House; he is also empowered to act as Deputy-speaker. The Assistant Clerk of Parliaments acts as clerk of the House. There are two other clerks; their chief duty is to keep the Journals, which are accepted by all other authorities as evidence of what is done by the House. The Serjeant-at-arms is the executive officer of the Commons.

Summoning Parliament.—When the sovereign is advised to summon a new parliament notice of that intention is given by proclamation. A writ of summons is sent to each lord of parliament; the Scottish peers elect the representative peers. A writ is also sent to the returning-officer of each constituency, commanding him to hold an election, and to return the name of the person elected. In counties the sheriff acts as returning-officer; in Scotland he acts also for burghs within his jurisdiction; in English boroughs this duty is commonly performed by the mayor. The lawful charges incurred by the returning-officer are borne by the candidates, an arrangement which is regarded with disfavour by those who wish to make it easy for poor men to enter parliament.

Places represented in Parliament.—The places represented in the House of Commons are counties and county divisions, boroughs and wards of boroughs, and universities. By the plan of redistribution adopted in 1884–85 the more populous counties and boroughs are divided into districts, each of which elects a single member. The plan is fairly convenient, and will probably hold its own in spite of the advocates of proportional representation. The seats allotted to the universities have been the cause of some controversy. In old times a university was a kind of borough within a borough; Oxford and Cambridge obtained at an early date the privilege of sending burgesses to parliament; Trinity College, Dublin, enjoyed a similar privilege, and now sends two members to Westminster; London University now elects one member, and the four Scottish universities elect two. The electors in all these cases are the graduate members of the university. Of course university men, if qualified, vote also for the places where they reside or have property, and this double representation is objected to as being inconsistent with democratic principles. There is also a considerable body of opinion hostile to all double qualifications; 'one man one vote' has been for some time a popular cry.

Electors.—The voters entitled to take part in the election are those whose names are on the register. Registration was introduced after the Reform Act of 1832; and the present law affords much more satisfactory means of proving and testing claims to vote than the rough and ready methods formerly in use. Lists of voters are made out by local authorities, and carefully revised, in England by barristers appointed for the purpose, in Scotland by the sheriff or his substitute in a registration court. The persons entitled to be placed on the register are male persons over twenty-one, not being peers, not disqualified by alienage, office, or employment, unsoundness of mind, conviction for crime or corrupt practices, or receipt of parochial relief, and possessing any of the property qualifications required by law. Before 1832 county members were elected in England by the freeholders assembled in the county court; an act of Henry VI. restricted the right of voting to those whose tenements were of the yearly value of forty shillings; in some boroughs the right of election belonged to a limited number of persons having freeholds or burgage tenements within the boroughs; in others the inhabitants paying scot and lot voted; in others, again, the right was restricted to members or officers of the corporation. In Scotland the county qualification was a forty-shilling land of old extent, or land not of old extent rated in valuation books at £400; in Edinburgh the election was by the town-council; the member for each group of royal burghs was chosen by delegates appointed by the town-councils. In Galt's novel, *The Provost*, there is a graphic and truthful description of a burgh election under the old system. The Irish borough and county franchises were modelled on the English system; on the passing of the Roman Catholic Emancipation Act in 1829 it was thought prudent to disfranchise freeholders under £10 a year. These old franchises have been in part destroyed and in part preserved by successive acts of reform. The statute law on the subject is voluminous and complicated, and the work of simplification is beset with difficulties; the opposition is always ready to suspect the party in power of what the Americans call 'gerrymandering'—i.e. of readjusting the electorate to suit its own interests.

The qualifications which now entitle a person to be registered and to vote are classified by Sir W. Anson as follows: (1) *Property.*—In England freehold of inheritance of forty shillings yearly value, freehold for life of £5 yearly value, copyhold of £5 yearly value, leasehold of £5 yearly value held for a term of sixty years or more, leasehold of £50 yearly value, if held for a term of twenty years or more, will qualify a person to vote in counties, and in towns which rank as counties. In Scotland land or heritage of £5 yearly value, leasehold of £10 yearly value held for life or for fifty-seven years or more, leasehold of £50 yearly value held for nineteen years or more will qualify for the county franchise. In Ireland freehold of £5 net annual value, rent charge or leasehold for life of £20 annual value, leasehold of £10 value held for sixty years or more, leasehold of £20 value held for fourteen years or more will qualify for the county franchise. Special rules have been made to prevent the multiplication of small freeholds for political purposes (the process popularly known as 'Faggot-voting,' q.v.). (2) *Occupation.*—The occupier of land or tenements of the yearly value of £10 is qualified to vote in any part of the United Kingdom, but the mode of ascertaining the value varies. In English and Scotch boroughs residence in or within 7 miles of the borough is required; and in all parts of the United Kingdom this franchise is made to depend on payment of rates. (3) *Residence.*—The inhabitant occupier of a dwelling-house, or of any part of a house occupied as a separate dwelling, is qualified; throughout the United Kingdom this franchise is made dependent on payment of rates. Lodgers occupying rooms of the yearly value (unfurnished) of £10 are also qualified. Certain rights of resident burgesses and freemen in English boroughs were preserved by the Act of 1832, and the liverymen of the City Companies retain the right to vote in the City of London.

Candidates—Conduct of the Election—Election Petitions.—On receiving the writ for an election the returning-officer fixes a day to receive the names of candidates. Any male British subject of full age, not disqualified by peerage, office, conviction, &c., may become a candidate. A candidate is required to have an agent for election expenses, and in promoting his candidature he is bound to see that no breach of the law is committed, and that the total expenses are kept within the limits prescribed by the Corrupt Practices Act, 1883 (see BRIBERY). If more candidates come forward than

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there are seats to be filled, a day is fixed for taking a poll of the electors; rooms or booths are fitted up for that purpose; each polling-place is supplied with a ballot-box, voting-papers, &c., and presided over by the returning-officer or one of his deputies. The elector votes by placing a cross opposite the name of the candidate of his choice; his paper is folded up by himself and dropped into the box; elaborate rules are made by the Ballot Act, 1872, to protect the secrecy of the vote (see BALLOT). Any material infraction of the law in conducting an election may be made the ground of a petition; the petitioners are required to find security for the costs: the petition is tried by two judges, who decide such questions of law and fact as may be raised, determine whether the person petitioned against has been duly elected or not, and report to the Speaker the result of their inquiry. If there is reason to believe that corrupt practices have extensively prevailed, commissioners may be appointed to make inquiry and report, and persons guilty of criminal offences may be prosecuted. The foregoing rules apply to the conduct of a general election, and also to the conduct of an election to fill a vacancy in the House of Commons caused by death, expulsion, or acceptance of office under the crown. The law does not permit a member of parliament to resign; if a member wishes to retire he applies to the Treasury for the stewardship of the Chiltern Hundreds (q.v.), and the acceptance of this has the effect of vacating his seat. When a member accepts high political office, as a general rule he vacates his seat, and must present himself for re-election.

Meeting of Parliament—Acts of Parliament.—When the Lords and Commons assemble at Westminster the Commons are directed to choose a Speaker. This having been done, and the members of both Houses having taken the oath of allegiance, the causes for which parliament has been called together are declared in the King's or Queen's Speech, which is read by the sovereign in person, or by the Lord Chancellor in the sovereign's presence, or by one of the lords commissioners who represent the sovereign in absence. The two Houses are free to take up matters not laid before them by the crown; business is usually begun in each House by reading a bill *pro formâ*, in order to assert the right of free deliberation. Two members are chosen in each House by ministers to move and second an address in answer to the royal speech; in the Commons this motion gives rise to an aimless and discursive debate, in which the whole policy of the government is attacked by the opposition. Such are the forms with which the first session of a new parliament is begun. Each House may adjourn at its own discretion from day to day and for the customary holidays. The session comes to an end when parliament is prorogued by the crown: prorogation puts an end to all sessional orders and to all pending business, except impeachments, writs of error, and appeals to the House of Lords. The public acts of parliament passed in a session form one statute, which is divided into chapters for convenience of reference. Thus, 'the 30 and 31 Vict. chap. 20' means the 20th chapter of the statute law made in a session which began in the 30th and continued into the 31st year of Queen Victoria's reign—in other words, the session of 1867. Copies of the statutes are engrossed for preservation among the rolls of parliament, and printed copies are sent to judges and magistrates; but no form of publication is required to give validity to a statute; all subjects are bound to take note of and obey the law. In applying the rules of a statute the courts are guided by the intention expressed in the act itself; they will not look at the arguments or assurances addressed to parliament in the course of debate. An act comes into force as soon as it receives the royal assent, unless some other time has been indicated in the act. It is a rule that no bill may be introduced twice in the same session; it has sometimes been found necessary to prorogue parliament in order that a rejected bill may be brought in again without delay.

Divisions—Committees.—A division is taken in either House by the voices of those present, the Lords crying 'Content' or 'Not content,' the Commons 'Aye' or 'No.' If the Speaker's decision as to the result of the vote is challenged, members pass out into the lobbies, and are 'told' or counted by members appointed for that purpose. In case the numbers are equal, in the Lords the question is decided in the negative; in the Commons the Speaker gives a casting vote. Matters which cannot conveniently be dealt with in the House are referred to a committee of the whole House, such as has been already described, or to a select committee. Witnesses may now be examined before committees of both Houses on oath. When a private bill is sent to a committee, the promoters and opponents attend with their counsel and agents; the inquiry partakes of a judicial character. The expense of proceedings before parliamentary committees is very great, and many proposals have been made to alter the existing system: a bill was before parliament in 1891 by which it was proposed to create a local tribunal to deal with Scotch private bills. In the House of Commons there were formerly four grand committees, for religion, for grievances, for courts of justice, and for trade. These four were discontinued in 1832; in 1882 two standing committees were appointed for the consideration of bills relating to law and courts of justice and to trade. These standing committees have done less to lighten the labours of the House than was at first expected; it is found that time may be wasted by reopening in the House questions which have been already discussed at length in the committee.

Prorogation and Dissolution.—When parliament has been prorogued it may be summoned to meet for another session; the new session is opened with a royal speech. When the government determines to 'go to the country'—i.e. to hold a general election, it is customary to put an end to the session by prorogation, and afterwards to issue a proclamation dissolving the parliament and to give directions for the issue of new writs of summons. Dissolution puts an end to the House of Commons for the time being; the members are no longer addressed by the title of M.P., and the Speaker becomes an ordinary commoner. The law directs that not more than three years shall elapse between the dissolution of a parliament and the calling of a new one; but, inasmuch as the Commons will not vote more than an annual supply of money, it is absolutely necessary that there should be at least one session of parliament in each year. No parliament may endure for more than seven years from the time when it is first summoned to meet. Triennial parliaments were established by a law of 1641; in the same year the Long Parliament got the king to agree to a bill depriving him of the right to dissolve that parliament without its own consent; the Triennial Act was repealed after the restoration of Charles II., and re-enacted in 1694. The period of seven years was fixed, instead of three years, by the Septennial Act, passed in 1716, soon after the accession of George I., at a time when the government desired to avoid the changes of popular opinion produced by frequent general elections. The act is praised by some critics and attacked by others, because it makes members more independent of the

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electors than they would be if they were constantly looking forward to an election.

'Omnipotence' of Parliament.—In foreign countries and in the British colonies the legislature is a limited body, which exercises the powers conferred upon it by a written constitution; its acts are void if they exceed its powers. An act of the congress of the United States, for example, may be set aside by a court of law if it is beyond the constitutional competence of congress. No British court can set aside an act of parliament on any such ground, for parliament defines its own powers and is not bound by any written constitution. In the words of Sir Edward Coke, the power of parliament 'is so transcendent and absolute that it cannot be confined, either for causes or persons, within any bounds.' The other legislative authorities of the empire act within the limits laid down for them by parliament. If a colonial government, for instance, wishes to deal with some matter outside the colony, it must, as a general rule, obtain an act of parliament for the purpose; a colonial legislature has an authority which is plenary as to causes and persons, but limited as to territorial area. The Septennial Act, cited above, illustrates what is meant by the omnipotence of parliament. A House of Commons, elected for three years under the Act of 1694, concurred in prolonging its own mandate to a period of seven years; and its action was perfectly legal and constitutional. Whether we should gain or lose by bringing the powers of parliament within legal bounds, it is not easy to decide.

Petitions to Parliament.—Petitions may be addressed to either House of Parliament by British subjects and persons resident in the British dominions; a petition must be presented by a member of the House to which it is addressed, except petitions from the corporation of London, which are presented by the sheriffs of London at the bar. The Lord Mayor of Dublin has also been allowed to present a petition, and the same privilege would probably be conceded to the Lord Provost of Edinburgh. It was formerly not unusual for the member presenting a petition to make a speech, but the standing orders of the Commons now forbid this to be done. There is a committee on public petitions which reports twice a week during the session.

Parliamentary Returns.—Each House may obtain information from the executive departments by asking for returns and papers. In dealing with a subordinate department, or a department created and regulated by statute, either House may order returns; if the department is that of a high officer of state, or if the matter inquired of concerns the sovereign's prerogative, it is usual to move a humble address, praying that the documents required may be furnished. Neither House will order a return regarding the proceedings of the other; but the members of one House have seldom any difficulty in obtaining papers printed for the use of the other. No return may be ordered from private persons and associations, unless under the provisions of an act of parliament. Confidential documents (e.g. cabinet memoranda, or opinions of the law officers of the crown) are never laid on the table in either House, unless for special reasons the government thinks it desirable.

Constituencies.—The following table shows the number of members sent to the House of Commons by constituencies of the United Kingdom; the names of the electoral divisions of a county or borough not being generally specified when they are all simply taken from the points of the compass, north, north-east, central, &c.

ENGLAND.

COUNTIES.

Bedford, 2.
- Biggleswade.
- Luton.

Berks, 3.
- Abingdon.
- Newbury.
- Wokingham.

Buckingham, 3.
- Buckingham.
- Aylesbury.
- Wycombe.

Cambridge, 3.
- Wisbech.
- Chesterton.
- Newmarket.

Cheshire, 8.
- Wirral.
- Eddisbury.
- Macclesfield.
- Crewe.
- Northwich.
- Altrincham.
- Hyde.
- Knutsford.

Cornwall, 6.
- St Ives.
- Camborne.
- Truro.
- St Austell.
- Bodmin.
- Launceston.

Cumberland, 4.
- Eskdale.
- Penrith.
- Cockermouth.
- Egremont.

Derby, 7.
- High Peak.
- North-east.
- Chesterfield.
- West.
- Mid.
- Ilkeston.
- South.

Devon, 8.
- Honiton.
- Tiverton.

Devon—*continued.*
- South Molton.
- Barnstaple.
- Tavistock.
- Totnes.
- Torquay.
- Ashburton.

Dorset, 4.
- North.
- East.
- South.
- West.

Durham, 8.
- Jarrow.
- Houghton-le-Spring.
- Chester-le-Street.
- North-west.
- Mid.
- South-east.
- Bishop Auckland.
- Barnard Castle.

Essex, 8.
- Walthamstow.
- Romford.
- Epping.
- Saffron Walden.
- Harwich.
- Maldon.
- Chelmsford.
- South-east.

Gloucester, 5.
- Stroud.
- Tewkesbury.
- Cirencester.
- Dean.
- Thornbury.

Hants, 6.
- Basingstoke.
- Andover.
- Petersfield.
- Fareham.
- New Forest.
- Isle of Wight.

Hereford, 2.
- Leominster.
- Ross.

Hertford, 4.
- Hitchin.
- Hertford.
- St Albans.
- Watford.

Huntingdon, 2.
- Huntingdon.
- Ramsey.

Kent, 8.
- Sevenoaks.
- Dartford.
- Tunbridge.
- Medway.
- Faversham.
- Ashford.
- St Augustine's.
- Thanet.

Lancashire, 23.
- North Lonsdale.
- Lancaster.
- Blackpool.
- Chorley.
- Darwen.
- Clitheroe.
- Accrington.
- Rossendale.
- Westhoughton.
- Heywood.
- Middleton.
- Radcliffe.
- Eccles.
- Stretford.
- Gorton.
- Prestwich.
- Southport.
- Ormskirk.
- Bootle.
- Widnes.
- Newton.
- Ince.
- Leigh.

Leicester, 4.
- Melton.
- Loughborough.
- Bosworth.
- Harborough.

Lincoln, 7.
- Gainsborough.
- Brigg.
- Louth.
- Horncastle.
- Sleaford.
- Stamford.
- Spalding.

Middlesex, 7.
- Enfield.

Middlesex—*continued.*
- Tottenham.
- Hornsey.
- Harrow.
- Ealing.
- Brentford.
- Uxbridge.

Monmouth, 3.
- North.
- West.
- South.

Norfolk, 6.
- North-west.
- South-west.
- North.
- East.
- Mid.
- South.

Northampton, 4.
- North.
- East.
- Mid.
- South.

Northumberland, 4.
- Wansbeck.
- Tyneside.
- Hexham.
- Berwick-on-Tweed.

Nottingham, 4.
- Bassetlaw.
- Newark.
- Rushcliffe.
- Mansfield.

Oxford, 3.
- Banbury.
- Woodstock.
- Henley.

Rutland, 1.

Shropshire, 4.
- Oswestry.
- Newport.
- Wellington.
- Ludlow.

Somerset, 7.
- North.
- Wells.
- Frome.
- East.
- South.
- Bridgwater.
- Wellington.

Stafford, 7.
- Leek.
- Burton.
- West.
- North-west.
- Lichfield.
- Kingswinford.
- Handsworth.

Suffolk, 5.
- Lowestoft.
- Eye.
- Stowmarket.
- Sudbury.
- Woodbridge.

Surrey, 6.
- Chertsey.
- Guildford.
- Reigate.
- Epsom.
- Kingston.
- Wimbledon.

Sussex, 6.
- Horsham.
- Chichester.
- Grinstead.
- Lewes.
- Eastbourne.
- Rye.

Warwick, 4.
- Tamworth.
- Nuneaton.
- Stratford-on-Avon.
- Rugby.

Westmorland, 2.
- Appleby.
- Kendal.

Wilts, 5.
- Cricklade.
- Chippenham.
- Westbury.
- Devizes.
- Wilton.

Worcester, 5.
- Bewdley.
- Evesham.
- Droitwich.
- North.
- East.

Yorkshire, 26.
- Thirsk and Malton.
- Richmond.

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Yorkshire—*continued.*
Cleveland.
Whitby.
Holderness.
Buckrose.
Howdenshire.
Skipton.
Keighley.
Shipley.
Sowerby.
Elland.
Morley.
Normanton.
Colne Valley.
Holmfirth.
Barnsley.
Hallamshire.
Rotherham.
Doncaster.
Ripon.
Otley.
Barkston Ash.
Osgoldcross.
Pudsey.
Spen Valley.

Boroughs.
Ashton-under-Lyne.
Aston Manor.
Barrow-in-Furness.
Bath, 2.
Bedford.
Birkenhead.
Birmingham, 7.
Edgbaston.
West.
Central.
North.
East.
Bordesley.
South.
Blackburn, 2.
Bolton, 2.
Boston.
Bradford, 3.
Brighton, 2.
Bristol, 4.
Burnley.
Bury.
Bury St Edmunds.
Cambridge.
Canterbury.
Carlisle.
Chatham.
Cheltenham.
Chester.
Christchurch.
Colchester.
Coventry.
Darlington.
Derby, 2.
Devonport, 2.
Dewsbury.
Dover.
Dudley.
Durham.
Exeter.
Falmouth and Penryn.
Gateshead.
Gloucester.
Grantham.
Gravesend.
Grimsby (Great).
Halifax, 2.
Hanley.
Hartlepool.
Hastings.
Hereford.
Huddersfield.
Hull, 3.
Hythe.
Ipswich, 2.
Kidderminster.
Leeds, 5.
Leicester, 2.
Lincoln.
Liverpool, 9.
Kirkdale.
Walton.
Everton.

Liverpool—*continued.*
West Derby.
Scotland.
Exchange.
Abercromby.
East Toxteth.
West Toxteth.
London & Metropolitan Boroughs, 62.
City, 2.
Battersea.
Bethnal Green, 2.
Camberwell, 3.
Chelsea.
Clapham.
Croydon.
Deptford.
Finsbury, 3.
Fulham.
Greenwich.
Hackney, 3.
Hammersmith.
Hampstead.
Islington, 4.
Kensington, 2.
Lambeth, 4.
Lewisham.
Marylebone, 2.
Newington, 2.
Paddington, 2.
St George.
St Pancras, 4.
Shoreditch, 2.
Southwark, 3.
Strand.
Tower Hamlets, 7.
Wandsworth.
West Ham, 2.
Westminster.
Woolwich.
Lynn Regis.
Maidstone.
Manchester, 6.
Middlesbrough.
Monmouth *district.*
Morpeth.
Newcastle-upon-Tyne, 2.
Newcastle-under-Lyme.
Northampton, 2.
Norwich, 2.
Nottingham, 3.
Oldham, 2.
Oxford.
Peterborough.
Plymouth, 2.
Pontefract.
Portsmouth, 2.
Preston, 2.
Reading.
Rochdale.
Rochester.
St Helen's.
Salford, 3.
Salisbury.
Scarborough.
Sheffield, 5.
Attercliffe.
Brightside.
Central.
Hallam.
Ecclesall.
Shields (South).
Shrewsbury.
Southampton, 2.
Stafford.
Stalybridge.
Stockport, 2.
Stockton.
Stoke-upon-Trent.
Sunderland, 2.
Taunton.
Tynemouth & N. Shields.
Wakefield.
Walsall.
Warrington.
Warwick & Leamington.
Wednesbury.
West Bromwich.
Whitehaven.
Wigan.

Winchester.
Windsor.
Wolverhampton, 3.
Worcester.
Yarmouth (Great).
York, 2.

Universities.
Cambridge, 2.
London.
Oxford, 2.

WALES.

Counties.
Anglesey.
Brecon.
Cardigan.
Carmarthen, 2.
Carnarvon, 2.
Eifion.
Arfon.
Denbigh, 2.
Flint.
Glamorgan, 5.
East.
Rhondda.
Gower.
Mid.
South.
Merioneth.
Montgomery.
Pembroke.
Radnor.

Boroughs.
Cardiff *district.**
Carmarthen ,,
Carnarvon ,,
Denbigh ,,
Flint ,,
Merthyr-Tydvil, 2.
Montgomery *district.*
Pembroke ,,
Swansea ,, 2.

* See articles Cardiff, Flint, &c.

SCOTLAND.

Counties.
Aberdeen, 2.
Argyll.
Ayrshire, 2.
Banff.
Berwick.
Bute.
Caithness.
Clackmannan & Kinross.
Dumbarton.
Dumfries.
Edinburgh.
Elgin and Nairn.
Fife, 2.
Forfar.
Haddington.
Inverness.
Kincardine.
Kirkcudbright.
Lanark, 6.
Govan.
Partick.
North-east.
North-west.
Mid.
South.
Linlithgow.
Orkney and Shetland.
Peebles and Selkirk.
Perth, 2.
Renfrew, 2.
Ross and Cromarty.
Roxburgh.
Stirling.
Sutherland.
Wigtown.

Boroughs.
Aberdeen, 2.
Ayr Burghs.
Ayr.
Campbeltown.
Inveraray.
Irvine.
Oban.
Dumfries Burghs.
Dumfries.
Annan.
Kirkcudbright.
Lochmaben.
Sanquhar.
Dundee, 2.
Edinburgh, 4.
Elgin Burghs.
Elgin.
Banff.
Cullen.
Inverurie.
Kintore.
Peterhead.
Falkirk Burghs.
Falkirk.
Airdrie.
Hamilton.
Lanark.
Linlithgow.
Glasgow, 7.
Bridgeton.
Camlachie.
St Rollox.
Central.
College.
Tradeston.
Blackfriars and Hutchesontoun.
Greenock.
Hawick Burghs.
Hawick.
Galashiels.
Selkirk.
Inverness Burghs.
Inverness.
Forres.
Fortrose.
Nairn.
Kilmarnock Burghs.
Kilmarnock
Dumbarton.
Port-Glasgow.
Renfrew.
Rutherglen.
Kirkcaldy Burghs.
Kirkcaldy.
Burntisland.
Dysart.
Kinghorn.
Leith Burghs.
Leith.
Musselburgh.
Portobello.
Montrose Burghs.
Montrose.
Arbroath.
Brechin.
Forfar.
Bervie.
Paisley.
Perth.
St Andrews Burghs.
St Andrews.
Easter Anstruther.
Wester Anstruther.
Crail.
Cupar.
Kilrenny.
Pittenweem.
Stirling Burghs.
Stirling.
Culross.
Dunfermline.
Inverkeithing.
Queensferry.
Wick Burghs.
Wick.
Cromarty.
Dingwall.

Wick Burghs—*contin'd.*
Dornoch.
Kirkwall.
Tain.

Universities.
Edinr. and St Andrews.
Glasgow and Aberdeen.

IRELAND.

Counties.
Antrim, 4.
Armagh, 3.
Carlow.
Cavan, 2.
Clare, 2.
Cork, 7.
Donegal, 4.
Down, 4.
Dublin, 2.
Fermanagh, 2.
Galway, 4.
Kerry, 4.
Kildare, 2.
Kilkenny, 2.
King's County, 2.
Leitrim, 2.
Limerick, 2.
Londonderry, 2.
Longford, 2.
Louth, 2.
Mayo, 4.
Meath, 2.
Monaghan, 2.
Queen's County, 2.
Roscommon, 2.
Sligo, 2.
Tipperary, 4.
Tyrone, 4.
Waterford, 2.
Westmeath, 2.
Wexford, 2.
Wicklow, 2.

Boroughs.
Belfast, 4.
Cork, 2.
Dublin, 4.
College Green.
Dublin Harbour.
St Stephen's Green.
St Patrick's.
Galway.
Kilkenny.
Limerick.
Londonderry.
Newry.
Waterford.

University.
Dublin, 2.

SUMMARY.

England—		
Counties	223	
Boroughs	227	465
Universities	5	
Wales—		
Counties	19	
Boroughs	11	30
Scotland—		
Counties	39	
Boroughs	31	72
Universities	2	
Ireland—		
Counties	85	
Boroughs	16	103
University	2	
Grand total for United Kingdom		670

For the history of parliament, see the constitutional histories of Stubbs, Hallam, and May; for its laws and customs, May's *Parliamentary Practice*, Anson's *Law and Custom of the Constitution*, and Lucy's *Handbook of Parliamentary Procedure*; for its relations with the executive, see especially Todd's *Parliamentary Government in England*. The details of electoral law will be found in the works of Rogers (England), Badenach Nicolson (Scotland), and W. H. Mann (Ireland). Information as to the persons now entitled to sit in the two Houses, and as to the constituencies represented in the House of Commons, will be found in Dod's *Parliamentary Companion*, Bartholomew's *Election Handbook since 1857* (1880), Sir C. E. Adam's *Political State of Scotland in*

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1788 (Edin. 1887), and the almanacs; besides the articles in this work on

Appeal.	Edward I.	Reform.
Ballot.	England (Hist. of).	Reporting.
Bribery.	Government.	Representation.
Cabinet.	Hansard.	Sovereign.
Chartism.	Impeachment.	Taxation.
Commissions.	Montfort.	Treasury.
Congress.	Nobility.	Westminster.
Cromwell.	Privy-council.	Witenagemote.

Parma, a town of Italy, formerly the capital of the duchy of Parma, is situated on the ancient Via Emilia, and on the river Parma, 12½ miles S. from the Po, and by rail 56 miles NW. of Bologna and 79 SE. of Milan. The town is surrounded by walls and has a citadel (1591); the streets are straight and wide. Of the sixty or more churches the chief is the cathedral (1059–74), built mostly in the Lombardo-Romanesque style, with frescoes by Correggio. Other notable edifices are the baptistery, one of the most splendid in Italy, begun in 1196 and completed in 1281; the church of Madonna della Steccata (1521–39), containing 'Moses breaking the Tables of the Law' and other paintings by Parmigiano, and the tombs of the Farnese dukes; the church of St John the Evangelist (1510), with frescoes by Correggio; the ducal palace, containing art-galleries (Correggio's works), a library (214,000 vols. and 4500 MSS., including many incunabula and rare works), the archives, &c.; and numerous other palaces, public and private. There are also a university (1599), with nearly fifty teachers and more than two hundred students, a music school, a museum of antiquities, &c. The principal industrial products are pianofortes, silks, cast-iron wares, woollens, earthenware, paper, soap, &c. There are cattle, corn, and silk markets. Pop. (1881) 44,492. Founded by the Etruscans, Parma became a Roman colony in 183 B.C. After the fall of the western empire it was known as Chrysopolis (Gold Town). A stout opponent of the emperors, it was besieged and taken by Frederick II. in 1245, and again invested, but without success, in 1248. It then belonged successively to the houses of Correggio, Este, Visconti, and in 1511 to the pope. —The *province* has an area of 1278 sq. m., and (1889) a pop. of 285,790.

Formerly Parma was the name of a sovereign duchy of Italy, lying between the Apennines and the Po, touching Sardinia (Piedmont) on the west and Modena on the east. It comprised the two duchies of Parma and Piacenza, and had an area of 2377 sq. m. (see geography under ITALY). The territories of the cities of Parma and Piacenza fell into the hands of the pope in 1511. Pope Paul III. of the house of Farnese (q.v.) incorporated them (1545) as a duchy for his natural son Pier-Luigi, the grandfather of the celebrated Alessandro Farnese, regent of the Low Countries. On the extinction of the male line of Farnese in 1731 the duchy passed to Don Carlos of Spain, but was transferred to Austria four years later. In 1748 it was restored, along with Guastalla, to the Spanish Bourbons. In 1796 it was seized by the French, in 1802 incorporated with France, and in 1814 was granted to the ex-empress Maria Louisa. On her death in 1847 it passed to the Bourbon Duke of Lucca. From this time until the incorporation with the kingdom of Italy in 1860 the duchy was in a most unsettled condition: the people were strongly revolutionary in feeling, and desired a union with Sardinia; but the rulers were reactionary and, supported by Austria, successfully beat down all attempts at revolution until after the battle of Magenta, when the Austrian troops withdrew and the regent for the youthful duke fled.

Parmenides, a Greek philosopher of Elea (*Velia*), in Lucania, and in the opinion of the ancients the greatest member of the Eleatic School (q.v.), flourished about the middle of the 5th century B.C. Nothing is known with certainty regarding his life, but Plato tells us he visited Athens in his old age together with his pupil Zeno, and conversed with Socrates, then quite a youth—an anachronism most probably intended to account for the influence which the philosophy of Parmenides undoubtedly exercised on that of Socrates and Plato themselves. Parmenides, like his master Xenophanes of Colophon, sometimes regarded as the first of the Eleatics, expounded his philosophy in verse —his only work being a didactic poem *On Nature*. The extant remains have been rendered into English hexameters by Thomas Davidson (*Journal of Speculative Philosophy*, St Louis, 1870), and paraphrased in English prose by W. L. Courtney (*Studies in Philosophy*, 1882). The leading design of this poem is to demonstrate the reality of Absolute Being, the non-existence of which Parmenides declares to be inconceivable, but the nature of which, on the other hand, he admits to be equally inconceivable, inasmuch as it is dissociated from every limitation under which man thinks. The permanent unity of the universe is thus the ultimate object of knowledge. Parmenides is not a theologist in speculation, seeking rather to identify his Absolute Being with *Thought* than with *Deity*.

The best edition of his fragments is in S. Karsten's *Philosophorum Græcorum Reliquiæ* (Amst. 1835). See also the histories of philosophy of Brandis, Erdmann, Schwegler, Ueberweg, and Zeller.

Parmigiano, or PARMIGIANINO, the nickname of GIROLAMO FRANCESCO MARIA MAZZOLA, painter of the Lombard school, and the most distinguished of those who followed the style of Correggio, was born at Parma, 11th January 1504. He began to paint when little more than fourteen years of age. In 1523 he went to Rome, and was favourably noticed and employed by Clement VII. When that city was stormed by the imperialists under Constable Bourbon in 1527 Parmigiano sat calmly at work on his picture of 'The Vision of St Jerome' (now in the National Gallery, London), and was protected from the soldiers who burst in upon him by their leader. After this event he left Rome for Bologna, where he painted various works, including a celebrated altarpiece, the 'Madonna and Child,' and returned to Parma in 1531. Having engaged to execute a series of frescoes in the church of S. Maria Steccata, and having got payment in advance, he delayed so long with the work that he was thrown into prison for breach of contract, and on being released fled to Casal Maggiore, in the territory of Cremona, where he died on 24th August 1540. His best-known picture is 'Cupid shaping a Bow;' he painted portraits too, as of Charles V., Amerigo Vespucci, and himself.

Parnahyba, a river of Brazil, rises in the Serra Mangabeiras, about 9° S. lat., and throughout its course (650 miles) forms the boundary between the states of Maranhão and Piauhy. It enters the Atlantic by six mouths. The stream is swift, but navigable by boats for nearly 350 miles. On the east bank, 14 miles from its mouth, is the unhealthy town of Parnahyba, with a considerable trade. Pop. 8000. See also PARANÁ.

Parnassus, a mountain in Phocis, regarded by the ancient Greeks as the central point of the earth. On its southern slope lay Delphi (q.v.), the seat of the famous oracle, and the fountain of Castalia (q.v.). The highest peak (8036 feet) was the scene of the orgies of the worship of Dionysus (Bacchus); all the rest of the mountain was sacred to Apollo and the Muses, whence poets were said to 'climb Parnassus,' a phrase still thus employed.

Parnell, CHARLES STEWART, Irish politician, was born at Avondale, in County Wicklow, June

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28, 1846. His father belonged to an old Cheshire family, which purchased an estate in Ireland under Charles II., and from which had sprung Thomas Parnell the poet and Sir Henry Brooke Parnell, created Baron Congleton in 1841. His great-grandfather was that Sir John Parnell who was long Chancellor of the Irish Exchequer, and an active supporter of Grattan in his struggle against the Union; his grandfather, William Parnell, sat for County Wicklow, and published in 1819 a foolish political novel, anything but Irish in sentiment; his mother, Delia Tudor Stewart, was daughter of Admiral Charles Stewart of the United States navy. He was educated at Yeovil and elsewhere in England under private masters, and was for some time a member of Magdalene College, Cambridge, but took no degree. In 1874 he became High Sheriff of County Wicklow; next year he contested County Dublin without success, but in April 1875 was returned as an avowed Home Ruler for County Meath. He attached himself to Joseph Biggar, the member for Cavan, who was the first to discover the value of deliberate obstruction in parliamentary tactics, and during 1877 and 1878 he gained great popularity in Ireland by his audacity in the use of the new engine. There were many scenes of violence and excitement, and the new horror of all-night sittings became familiar to the House of Commons. Throughout the struggle Parnell showed equal audacity and coolness, and acquired a masterly knowledge of parliamentary forms. Mr Butt, the Irish leader, disapproved of this development of the *active* or obstructive policy, but his influence quickly gave way before Parnell's, and in May 1879 he died. The year before Parnell had been elected president of the English Home Rule Association. He now threw himself with energy into agrarian agitation, gave it its watchword—'Keep a firm grip of your homesteads'—at Westport in June, and in October was elected president of the Irish National Land League, which had been founded by Michael Davitt. Mr Parnell next visited the United States to raise funds for the cause, was allowed like Lafayette and Kossuth to address congress itself, and carried home £70,000. At the general election of 1880 he was returned for the counties of Meath and Mayo and for the city of Cork, and chose to sit for the last. He was now formally elected chairman of the Irish parliamentary party by twenty-three votes over eighteen for Mr Shaw. Meantime the agrarian agitation grew, and in a speech at Ennis, September 19, 1880, he formulated the method of boycotting as an engine for punishing an unpopular individual. Mr Gladstone's government now came to the conclusion that the objects of the Land League were contrary to the law, and in December put Parnell and several other members of the executive on trial, but the jury finally failed to agree. Next session the government brought in a Coercion Bill, which Mr Parnell opposed vigorously. In the course of the struggle he was ejected from the House, after a stormy scene, together with thirty-four of his followers, February 3, 1881. Mr Gladstone next carried his famous Land Bill, but this Parnell refused to accept as a final settlement until the result of certain test cases before the new Land Court was seen. On the 13th October Mr Gladstone sent him to Kilmainham gaol, and there he lay till released on May 2, 1882, after some private negotiations with the government conducted through the medium of Captain O'Shea. Mr Forster resigned the Irish secretaryship in consequence of the release, and next followed the terrible tragedy of Phœnix Park, of which Parnell in his place in the House of Commons expressed his detestation. The Crimes Act was now hurried through parliament in spite of the strenuous opposition of the Irish party. Already the Land League had been proclaimed as an illegal association after the issue of the 'No Rent' manifesto, but early in 1884 the Nationalists succeeded in reviving it under the name of the National League, and Mr Parnell was elected its president. The year before the sum of £35,000, mostly raised in America, had been presented to him by his admirers. After an unsuccessful attempt to make terms with the Conservatives, in the course of which he had a famous interview with Lord Carnarvon, the viceroy, Parnell flung his vote—now eighty-six strong since the lowering of the franchise—into the Liberal scale, and so brought about the fall of the short-lived first Salisbury government. Mr Parnell nominated the greater number of Nationalist candidates for the Irish constituencies, and the firm hand with which he controlled his party was seen in the promptitude with which he crushed a revolt of Healy and Biggar against his nomination of Captain O'Shea for Galway.

Mr Gladstone's views on the question of Home Rule had by this time undergone a complete change, and accordingly he introduced a Home Rule Bill, which was defeated owing to the defection of a large number of Liberal members headed by Lord Hartington and Mr Chamberlain. The consequent appeal to the country (July 1886) gave Lord Salisbury a Unionist majority of over a hundred votes, and threw Parnell into a close alliance with Mr Gladstone and the portion of the Liberal party that adhered to him. It was at this period that the *Times* newspaper published its series of articles entitled 'Parnellism and Crime'—a tremendous indictment against the chief Nationalist leaders, the most startling point in which was a series of letters published in fac-simile, one, signed by Parnell, expressing approval of Mr Burke's murder. The public excitement occasioned led to the appointment of a Special Commission to inquire into the whole matter. After an elaborate trial (extending to 128 days, and closing November 22, 1889), the most sensational event in which was the breakdown under cross-examination, and the flight and suicide at Madrid, of Pigott, the wretched Irishman who had imposed upon the *Times* with forgeries, Mr Parnell was formally cleared of the charge of having been personally guilty of organising outrages, but his party were declared to have been guilty of incitements to intimidation, out of which had grown crimes which they had failed to denounce. Parnell now raised an action against the *Times*, which was quickly compromised by a payment of £5000. The 'uncrowned king' of Ireland had now reached the summit of his power—the height of the wave was marked by the presentation of the freedom of Edinburgh, July 30, 1889, and the banquet given him on his forty-fourth birthday. But his fall in public esteem was quickly to follow. A few months later his frequent mysterious absences from his parliamentary duties were explained by his appearance, or rather his non-appearance, as co-respondent in a disgraceful divorce case brought by Captain O'Shea against his wife. After formal evidence was led by the petitioner, the usual decree was granted with costs against Parnell (November 17, 1890). The Gladstonian party in England now demanded his retirement from the leadership of the cause, and Mr Gladstone informed the Irish members that they must make their choice between Parnell and himself. They met and reappointed him their chairman, expecting, as the majority explained later, that after this recognition of his past services he would voluntarily retire at least for a time. But they had not calculated upon the characteristic obstinacy of his nature, and quickly found that their leader had no mind to efface him-

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self for his country's good. After some days of profitless and heated wrangling the majority ended the discussion by leaving the room and electing Justin M'Carthy as their chairman. Parnell, with the shattered remnants of his party, now carried the warfare into Ireland; but his condemnation by the Church and the emphatic defeat of his nominees at by-elections foretokened the complete collapse of his party at the general election of 1892, when seventy-two Anti-Parnellites were returned as against but nine who claimed his name and the succession to his policy. For the great discredited and discrowned leader had died suddenly at Brighton, 6th October 1891, but five months after his marriage to Mrs O'Shea. Parnell's commanding personality might have made defeat less disastrous, but could hardly have prevailed against the strong conviction forced on Nationalists and English Home Rulers alike, that he had fatally confounded personal ambition with patriotism.

See T. P. O'Connor's *Parnell Movement* (1886), and the Life (1891); also Justin H. M'Carthy, *England under Gladstone* (1884).

Parnell, THOMAS, a minor Queen Anne poet, born in Dublin in 1679, son of a commonwealth's man who at the Restoration left Congleton in Cheshire for Ireland. He had his education at Trinity College, took orders, and in 1705 received the archdeaconry of Clogher, later a prebend from Archbishop King and the vicarage of Finglass. The head of an English family settled in Ireland, with property both in that country and in Cheshire, he spent most of his time in London, where his wit procured him the friendship of Harley, Swift, and Pope, and opened to him the Scriblerus Club. Dr Johnson tells us that his well-timed change of politics coincided with the ejection of the Whigs in the end of Queen Anne's reign. After his wife's death he took to drinking, and died at Chester, July 1717, while on his way to Ireland. Next year Pope published a selection of his poems, mostly translations or adaptations, with the merit at least of being ever smooth and easy in versification. The best known of his poems is the *Hermit*, a polished and harmonious poem, based upon a tale in the *Gesta Romanorum*. Still better as poetry, however, are the two remarkable odes, the *Night-piece* and the *Hymn to Contentment*. See the admirable Life by Goldsmith, reprinted in the Globe edition of Goldsmith's works (1881).

Parody, a burlesque and consciously exaggerated imitation of a serious poem, the words of which should strike the ear with the very echo of the original. So to parody a writer is obviously to pay a compliment to his popularity, and at the outset we may admit the truth of Shaftesbury's paradox that 'a subject which will not bear raillery is suspicious,' provided it be not taken to mean that ridicule is to be the test of truth. The making of parodies is a harmless amusement, and moreover they may be an effective means of exposing weakness and affectation; but it must never be forgotten that, as there are, says Bacon, certain things to be privileged from jest, so there is a region of poetry into which this form of imitation may not enter. And, apart altogether from their subject, there are some poems so unapproachably beautiful in mere form and melody that to attempt a parody is a sin. Yet there are fools of such obliquity of vision and darkened understanding that they will rush in to tread even upon holy ground and try to wring a jest out of anything. For example, Sir Charles Hanbury Williams' *Old England's Te Deum* is a form of merriment altogether to be disallowed, as are also the Mock Litanies and Visitations of Sick Parliaments of Puritan times, and those three indifferent performances of Hone, magnified in 1817 by the foolishness of persecution into 'impious, profane, and scurrilous libels.'

To show any reason for its existence a parody must be very good, its subject legitimately within the range of the comic, itself skilful as an adaptation of a well-known original, and that original neither too good to be above, nor too bad to be beneath, ridicule. Its highest end is to emphasise by the exaggeration of caricature some mannerism or trick of metre; its surest success depends on a felicity in catching the flow of some familiar and favourite rhythm. It is true that thoroughly to enjoy a parody must detract a little from our pleasure in the original; yet no parody will please which is not genial and human, the child at once of appreciation and knowledge. At its highest, as in Calverley, it flows from a quite unusual combination of delicacy, creative imagination, and faculty for imitation, added to a dexterous mastery of rhythms. Jeffrey, in his review of the famous *Rejected Addresses*, distinguishes between the mere imitation of externals and that higher and rarer art which brings before us the intellectual characteristics of the original. Of the latter order a diligent search has discovered but few English examples, amid the thousands of Mr Walter Hamilton's six bulky volumes.

The name parody is due to the Greeks, and the first parodist, according to Aristotle, was Hegemon of Thasos, whose parody of the *Gigantomachia* made the Athenians forget for a moment even their disasters in Sicily. Others ascribe its origin to Hipponax, a comic poet, who flourished about 540 B.C. The well-known *Batrachomyamachia*, or Battle of the Frogs and Mice, is an ancient mock-heroic *epos;* and there is extant, preserved in Athenæus, a fragment of several hundred lines by Matron, on an Attic banquet, in which each dish is introduced with epic solemnity after the manner of Homer. The comedies of Aristophanes contain many subtle touches of sarcastic banter belonging more or less definitely to this order, and we find a further development in the hexameter *Silli* of Timon of Phlius. Among the Romans we first meet this form of literature in the period of decline. The first satire of Persius is interspersed with numerous parodies on the most popular poems of the day, but there seems no adequate evidence for the assertion that the most severe of these were aimed at the verses of Nero. In France the burlesques of Scarron (*Virgile travestié*) and Dassoucy created a taste which Boileau and others strove to counteract, and were imitated in England by Charles Cotton and John Philips in his *Splendid Shilling*—a vastly overrated outrage on *Paradise Lost*. Of modern English parodies some of the most felicitous examples are to be found in the *Rejected Addresses*, full of clever and genial satire unblemished by vulgarity, of which its authors could say that of the twelve poets imitated 'not one ever betrayed the least soreness or refused to join in the laugh that we had occasioned.' The Bon Gaultier *Ballads*, by Aytoun and Sir T. Martin, contain six admirable imitations professing to be by the unsuccessful candidates for the laureateship on the death of Southey. There are some exquisite examples in the two classical children's books of Lewis Carroll, but no parodies can be compared with those to be found in C. S. Calverley's *Verses and Translations* and *Fly Leaves*. Of these it is enough merely to name 'The Cock and the Bull,' and 'Lovers, and A Reflection' as masterpieces of the art. Seven clever imitations of as many leading poets of the day, including the reputed writer himself (A. C. Swinburne), were published anonymously as *The Heptalogia, or the Seven against Sense* (1880). Among elaborate prose parodies most famous

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are the *Epistolæ Obscurorum Virorum*, but of these either the humour has long since evaporated, or modern men cannot now feel the merriment of what drew tears of laughter from the great Erasmus. Of modern English examples may be mentioned Thackeray's 'Codlingsby' on Disraeli, and 'George de Barnwell' on Lytton; Bret Harte's *Condensed Novels;* and F. C. Burnand's 'New Sandford and Merton,' and 'Strapmore' on a too popular novel by Ouida.

See the article BURLESQUE; Delepierre, *La Parodie chez les Grecs, les Romains, et les Modernes* (Lond. 1871); and for a vast collection of English examples of all degrees of value, Walter Hamilton's too voluminous *Parodies of the Works of English and American Authors* (6 vols. 1884–89).

Parole (Fr., 'word') is the declaration made on honour by an officer, in a case in which there is no more than his sense of honour to restrain him from breaking his word. Thus, a prisoner of war may be released from actual prison on his parole that he will not go beyond certain designated limits; or he may even be allowed to return to his own country on his parole not to fight again, during the existing war, against his captors. To break *parole* is accounted infamous in all civilised nations, and an officer who has so far forgotten his position as a gentleman ceases to have any claim to the treatment of an honourable man, nor can he expect quarter should he again fall into the hands of the enemy he has deceived. For parole evidence, see EVIDENCE.

Paropamisus, an ancient name still used for a ridge, less than 1000 feet above the adjacent country, which forms part of the northern edge of the great plateau of Persia and Afghanistan, almost connecting the Hindu Kush (q.v.) on the east with the Elburz Mountains to the west (see ASIA, Vol. I. p. 487).

Paros, one of the larger islands in the Cyclades division of the Greek Archipelago; a low pyramid in shape, it has an area of 64 sq. m. and a pop. of nearly 7000, of whom some 2200 live in the capital, Parœkia. Wine, figs, and wool are exported. The quarries of the famous white Parian marble are near the summit of Mount St Elias (ancient *Marpessa*), and are not yet exhausted. Archilochus and Polygnotus, the painter, were born on Paros.

Parotid Gland. See DIGESTION, SALIVARY GLANDS.

Parquetry, a kind of wood mosaic used only for flooring. Parquetry floors are usually of oak, but other and more ornamental woods have also been much used for giving variety and beauty to the pattern. In the more elaborate kinds of parquetry veneers are used, but it is much more generally composed of blocks of wood squared at the sides, and laid down so as to combine and form a geometric pattern.

Parr. See SALMON.

Parr, CATHARINE, the sixth wife of Henry VIII., was the daughter of Sir Thomas Parr, and was born in 1512. Married first to one Edward Borough, possibly Lord Borough, and afterwards to Lord Latimer, she on July 12, 1543, became queen of England by marriage with Henry VIII. She was distinguished for her learning and for her knowledge of religious subjects, her discussion of which with the king had well-nigh brought her to the block, like so many of her predecessors. Her tact, however, saved her; for she made it appear to the king's vanity that she had only engaged him in discourse about the Reformation in order to derive profit from his majesty's conversation. She persuaded Henry to restore the right of succession to his daughters, and interested herself on behalf of the universities. After Henry's death she married (1547) Sir Thomas Seymour, and died from the effects of child-birth in the following year.

Parr, SAMUEL, a once notable scholar, was born the son of a surgeon at Harrow-on-the-Hill, January 15, 1747. He attended Harrow School, and, after being found unfit for apprenticeship to his father's profession, was sent to Emmanuel College, Cambridge, in 1765. Two years later his father's death obliged him to leave Cambridge and accept an assistant-mastership at Harrow. Here he remained nearly five years, but, disappointed of the head-mastership on Dr Summer's death (1771), started an independent school at Stanmore, and kept it going five years. He was head-master of Colchester grammar-school (1776–78) and of Norwich (1778–86). His clerical preferments were the rectory of Asterby in Lincolnshire, the vicarage of Hatton near Warwick, and a prebendal stall in St Paul's Cathedral. He spent almost the half of his life at Hatton, and here he died, March 6, 1825. The degree of LL.D. was given him by Cambridge in 1781. In 1787 he published an edition of Bellenden, to which he prefixed his celebrated preface, which is as remarkable for its uncompromising advocacy of Whig principles as for the scrupulous Ciceronianism of its Latinity.

It is almost impossible to understand the reputation which Dr Parr once had. None of his voluminous writings justify it. That he was in some respects an accomplished scholar is undoubted, for he could write Latin of Ciceronian purity and finish; but it is equally undoubted that he never did anything with his boasted scholarship, and has left the world absolutely nothing to keep him in remembrance. Yet his complete works (edited by Dr J. Johnstone in 1828) form eight enormous tomes, and contain 5734 octavo pages, many of them printed in small type. They relate to matters historical, critical, and metaphysical, but in all 'the thread of Parr's verbosity is finer than the staple of his argument.' To his conversational powers alone he owed the fame that he enjoyed during his life. He was an amazing, an overwhelming talker. Bold, dogmatic, arrogant, with a memory profoundly and minutely retentive, and with a genuine gift of ephemeral epigram, he seemed, at the tables of statesmen, and wits, and divines, to be a man of tremendous talent, capable of any literary feat; but the learning and the repartee have left little trace of their existence, and posterity declines to admire the wonders that it has neither seen nor heard.

See E. H. Barker's ill-arranged *Parriana* (2 vols. 1828–29), De Quincey's essay, and the Lives by Field (1828) and Johnstone (1828).

Parr, THOMAS ('Old Parr'), was born, according to the tradition, in 1483 and died in 1635. See LONGEVITY.

Parra. See JACANA.

Zebra Parrakeet (*Melopsittacus undulatus*).

Parrakeet, or PARROQUET, a name very commonly given to many of the smaller species of the parrot family. The

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only one we shall notice is the Zebra Parrakeet (*Melopsittacus undulatus*), a very beautiful little species, which has often been brought to England, and will breed in confinement. In the vast inland plains of Australia this parrakeet is to be seen in flocks of many hundreds feeding on the seeds of the grasses, which afford food also to many other small species. See PARROT.

Parramatta, a town of New South Wales, stands on a western extension of Port Jackson, 14 miles W. of Sydney, with which it is connected both by steamer and railway. The streets are wide and regular. 'Colonial tweeds,' 'Parramatta cloths' (first made at Bradford from wool exported hence), beer, soap, candles, and tiles are manufactured. Much fruit, especially the orange, is grown here. Pop. (1881) 8433; (1888) 12,000. Parramatta, formerly called Rosehill, is, after Sydney, the oldest town in the colony, having been laid out in 1790.

Parrhasius, one of the greatest painters of ancient Greece, was at Athens and already distinguished before the end of the 4th century B.C. According to Xenophon, he held a conversation with Socrates, and he was a younger contemporary of Zeuxis. Parrhasius appears to have surpassed all his predecessors in purity of design, accuracy of drawing, force of expression, and what is technically called 'finish.' And it seems that his vanity and pride were equal to his artistic skill.

Parricide (Lat. *paricida*) is rather a popular than a legal term. In the Roman law it comprehended every one who murdered a near relative; but in English the term is usually confined to the murderer of one's father, or of one who is *in loco parentis*. The parricide does not, in any respect, differ in Britain from the murderer of a stranger; in both cases the punishment is death by hanging. In the Roman law a parricide was punished in a much more severe manner, being sewed up in a leather sack, along with a live cock, viper, dog, and ape, and cast into the sea.

Parrish, EDWARD (1822–72), an American pharmacist, member of a family of distinguished physicians, connected for many years with Philadelphia, and best known through 'Parrish's Chemical Food.' This is the popular name for a non-officinal preparation medicinally known as *Compound Syrup of Phosphate of Iron*, every drachm of which contains 1 grain of phosphate of iron, 2½ of phosphate of lime, besides soda and potash.

Parrot, the type of a large and important group of birds, divided into numerous families and genera. The parrots form an extremely compact group, showing but little structural variation, and offering no 'intermediate forms' to indicate their relationship to other birds. It has been suggested that they come nearest to the birds of prey, but this is at present no more than a suggestion. They are pre-eminently tropical birds, and arboreal in habit; some species, however, range into colder countries—e.g. Patagonia and New Zealand—and some, such as the burrowing Ground Parrot of New Zealand (Strigops), now nearly exterminated by the cats run wild which infest the scrub, are not arboreal. They are fruit and seed eating birds, with the exception of the Kea (q.v.), which has, since the colonisation of New Zealand, taken to a carnivorous diet. As a rule the parrots are brightly coloured birds, being often, like other forest-frequenting creatures, green; there are some species, however, which are not brilliantly coloured. There is occasionally a difference of colour in the two sexes, which is best marked in species belonging to the genus Eclectus; in these the prevailing colour of the female is red, and of the male green; the differences are so marked that they were actually referred to quite different genera until Dr A. B. Meyer showed conclusively that the red and green forms were merely the two sexes of the same species. The intelligence of parrots has been often commented upon, as also their power of imitating human speech; any one, however, who can endure for a sufficient time that pandemonium of noise, the parrot-house at the Zoological Gardens, will find that the clearness of utterance of the Myna or Indian Starling exceeds that of any parrot. The great age to which parrots will live has often been exaggerated, but it is at anyrate certain that some species will survive for fifty years in confinement, for an individual of the Greater Vasa Parrakeet (*Coracopsis vasa*) lived for more than fifty years at the Zoological Gardens. Parrots make their nests in holes, and lay white eggs, as is commonly the case where the eggs are concealed. Garrod has divided the parrots, on anatomical grounds, into two families: (1) Palæornithidæ (including the Cockatoo, q.v., and Lory, q.v., the flightless New Zealand Strigops, and the large genus Palæornis) and (2) Psittacidæ (including the Macaws, the African parrots of the genus Psittacus, the American Chrysotis, the Australian Platycercus, and some other forms). The Gray Parrot (*Psittacus erythacus*), which has been a familiar cage-bird in Europe for hundreds of years, is a native of Africa, especially of West Africa. The Great Macaw belongs to the subfamily of Conurinæ, found mainly in America, one genus only (Palæornis) occurring in India and Africa. See Dr W. T. Greene's *Parrots in Captivity* (3 vols. 1884).

The Gray Parrot.

Parrot-fish, or PARROT-WRASSE (*Scarus*), a genus of fishes of the family Labridæ. The name seems to refer to the frequently bright colours, and partly to the shape of the mouth; for the jaws form a strong and sharp beak, and the teeth are soldered together. Over a hundred species are known, especially from the tropical coral-banks, on which they browse. The most northern species (*S. cretensis*) is the famous Scarus, about which Greek and Roman epicures were extraordinarily enthusiastic. Wonderful stories were told of its love, its wisdom, its habit of rumination, and the sounds which it makes. Pliny relates that in the reign of the Emperor Claudius a lot of Scari were brought from the Troad, released in the Italian sea, and strictly protected for five years till they became very abundant. The fish feeds chiefly on Fucus, and is certainly very palatable.

Parry, SIR WILLIAM EDWARD, Arctic navigator, was born at Bath, 19th December 1790, entered the navy as midshipman in 1806, and saw some active service against the Danes in 1808. In 1810 he was sent to the Arctic regions in command of a ship, for the purpose of protecting the British whale-fisheries. At this time he worked out rules for determining accurately the altitude of the pole by observations of the fixed stars. Parry took command in five expeditions to the Arctic regions: (1) in 1818, under Ross, who set out to find the North-west Passage; (2) in 1819, in chief command of two vessels, he explored Barrow Strait, Prince

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Regent's Inlet, and Wellington Channel, and wintered in Melville Island, but his attempt in the spring to reach Behring Strait was frustrated by the state of the ice; (3) from May 1821 to November 1823 he was again at the head of an expedition, which, however, achieved little; (4) a fourth voyage in 1824–25 had a like result; (5) his last voyage was an attempt (1827) to reach the North Pole on sledges by way of Spitzbergen—in which he was of course unsuccessful. After his return home from his second expedition he was awarded the £5000 which parliament had offered to the navigator who first crossed 110° W. long. In 1823 he was appointed hydrographer to the navy; in 1829 was knighted, along with Sir John Franklin; and in 1837 was made comptroller of a department of the navy. In 1846 he retired, accepting the post of superintendent of Haslar; in 1852 he was raised to the rank of rear-admiral, and in the following year was appointed governor of Greenwich Hospital, an office which he held till his death, 8th July 1855, at Ems in Germany. A collected edition of his voyages was published in 1833 (Lond. 5 vols.). See *Life* by his son, Rev. Edward Parry (Oxford, 1857).

Parsees (*Pârsis*, 'people of Pars or Fars'—i.e. ancient Persia; sometimes called Guebres, q.v.) is the name of the small remnant of the followers of the ancient Persian religion, as established or reformed by Zoroaster (Zarathustra or Zerdusht). The relation in which Zoroaster stood to the ancient Iranian faith and his date have been much debated; the very fact of his historical existence has even been denied; and accordingly it is difficult to dogmatise on the original principles of the Zoroastrian faith. These questions will be more fully discussed under the heads ZOROASTER and ZEND-AVESTA. It has been alleged that at first the doctrine was a pure Monotheism; that Zoroaster taught the existence of but one deity, the Ahura-Mazdâo (Ormuzd), the creator of all things, to whom all good things, spiritual and worldly, belong. The principle of his speculative philosophy, on the other hand, was dualism: there being in Ahura-Mazdâo two primeval causes of the real and intellectual world—the Vohu Manô, the Good Mind or Reality (Gaya), and the Akem Manô, or the Naught Mind or Non-reality (Ajyâiti). Certainly, however, the pure idea of Monotheism, if it ever existed, did not long prevail. The two sides of Ahura-Mazdâo's being were taken to be two distinct spirits, Ahura-Mazdâo and Angrô-Mainyush (Ahriman), who represented Good and Evil—God and Devil. These each took their due places in the Parsee pantheon ere long, and Parsism became a characteristic dualism.

The Zoroastrian creed flourished up to the time of Alexander the Great, throughout ancient Irania, including Upper Tibet, Sogdiana, Bactriana, Media, Persis, &c.; but after Alexander's death it gradually lost ground, rapidly declined under his successors, and under the Arsacidæ was much depressed. On the establishment of the Sassanians (212 A.D.), a native Persian dynasty, by Ardashir (Artaxerxes), the first act of the new king was the general and complete restoration of the partly lost, partly forgotten books of Zerdusht, which he effected, it is related, chiefly through the inspiration of a Magian Sage, chosen out of 40,000 Magi. The sacred volumes were translated out of the original Zend into the vernacular and disseminated among the people at large, and fire-temples were reared throughout the length and breadth of the land. The Magi or priests were all-powerful, and their hatred was directed principally against the Greeks. 'Far too long,' wrote Ardashir, the king, to all the provinces of the Persian empire, 'for more than five hundred years, has the poison of Aristotle spread.' The fanaticism of the priests often also found vent against Christians and Jews. The latter have left us some account of the tyranny and oppression to which they as unbelievers were exposed—such as the prohibition of fire and light in their houses on Persian fast-days, of the slaughter of animals, the baths of purification, and the burial of the dead according to the Jewish rites—prohibitions only to be bought off by heavy bribes. In return the Magi were cordially hated by the Jews; but later we frequently find Jewish sages on terms of friendship and confidence with some of the Sassanian kings. From the period of its re-establishment the Zoroastrian religion flourished uninterruptedly for about 400 years, till in 651 A.D., at the great battle of Nahavand (near Ecbatana), the Persian army under Yezdejird was routed by the calif Omar. The great mass of the population was converted to the Mohammedan faith; the small remnant fled to the wilderness of Khorassan, but were subjected, as might be expected, to severe oppression and persecution. Some nine thousand 'Guebres' are still found in Persia, mainly in Yezd, Kerman, and at Teheran. Others, who preferred emigration to the endless tribulations inflicted upon them by the conquering race, found a resting-place along the western coast of India, chiefly at Bombay, Surat, Ahmedabad, and the vicinity, where they now live under English rule, and are recognised as one of the most respectable and thriving sections of the community, being for the most part merchants and landed proprietors. Parsee traders have also settled at Calcutta, Madras, Aden, Zanzibar, in Burma, and in China. They bear equally with their poorer brethren in Persia the highest character for honesty, industry, and peacefulness, while their benevolence, intelligence, and magnificence outvie that of most of their European fellow-subjects. Their general appearance is to a certain degree prepossessing, and many of their women are strikingly beautiful. In all civil matters they are subject to the laws of the country they inhabit; and its language is also theirs, except in the ritual of their religion, when Zend, the holy language, is used by the priests, who as a rule, however, have no more knowledge of it than the laity. They are forward to embrace the advantages of English education, and not a few have studied law in England. Conspicuous amongst Parsee merchant-princes was Sir Jamsetjee Jejeebhoy (q.v.). In 1881 there were 73,760 Parsees in British India, two-thirds of them in Bombay city.

We have spoken of the leading fundamental doctrines as laid down by their prophet. Parsees do not eat anything cooked by a person of another religion; they also object to beef and pork, especially to ham. Marriages can only be contracted with persons of their own caste and creed. Polygamy, except after nine years of sterility and consequent divorce, is forbidden. Fornication and adultery are punishable with death. Their dead are not buried, but exposed on an iron grating in the Dakhma, or Tower of Silence, to the fowls of the air, to the dew, and to the sun, until the flesh has disappeared, and the bleaching bones fall through into a pit beneath, from which they are afterwards removed to a subterranean cavern.

Ahura-Mazdâo being the origin of light, his symbol is the sun, with the moon and the planets, and in default of them the fire. Temples and altars must for ever be fed with the holy fire, brought down, according to tradition, from heaven, and the sullying of whose flame is punishable with death. The priests themselves approach it only with a half-mask over the face, and never touch it but with holy instruments. But however great the awe felt by Parsees with respect to fire and

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light (they are almost the only eastern nation who abstain from smoking), yet they never consider these as anything but emblems of divinity. The fires are of five kinds. There are also five kinds of 'Sacrifice,' which term, however, is rather to be understood in the sense of a sacred action—including the slaughtering of animals; prayer; the sacrifice of expiation, consisting either (*a*) in flagellation or (*b*) in gifts to the priest; and, lastly, the sacrifice for the souls of the dead. The purification of physical and moral impurities is effected, in the first place, by cleansing with holy water, earth, &c.; next, by prayers and the recitation of the divine word; but other self-castigations, fasting, celibacy, &c. are considered hateful to the Divinity. The ethical code may be summed up in the three words—purity of thought, of word, and of deed: a religion 'that is for all, and not for any particular nation,' as the Parsees say. Various superstitions have in the course of the tribulations of ages and the intimacy with neighbouring countries defiled the original purity of this creed, and its forms now vary much among the different communities of the present time. There are two main sects amongst them, as well as Conservatives and Liberals in usage, the latter allowing many innovations resisted by the others.

For further information, see the articles PERSIA, ZEND-AVESTA, ZOROASTER (and works there quoted), DEVIL; Monier Williams, *Modern India* (4th ed. 1887); Houtum-Schindler in the *Ztschr. Deutsch. Morgenl. Ges.*, xxxvi.; Haug, *Essays on the Sacred Language, Writings, and Religion of the Parsees* (2d ed. by West, 1878); Hovelacque, *L'Avesta, Zoroastre, et le Mazdéisme* (1880); and Dosabhai Framji Karaka, C.S.I., *History of the Parsis* (2 vols. Lond. 1884).

Parsley (*Petroselinum*), a genus of plants of the natural order Umbelliferæ. The species are annual or biennial, branching, smooth, herbaceous plants, with variously pinnated leaves. Common Parsley (*P. sativum*), which has tripinnate shining leaves, one of our best-known culinary plants, is a native of the south of Europe, growing chiefly on rocks and old walls, and naturalised in some parts of England. The cultivation of parsley is extremely simple, seed requiring to be sown annually in order to keep up a constant supply. A variety with curled leaflets is generally preferred to the common kind with plain leaflets, as finer and more beautiful, being often used as a garnish; it is also safer, as the poisonous Fool's Parsley (q.v.) is sometimes gathered by mistake instead of the other. Hamburg Parsley is a variety with a large white carrot-like root, cultivated for the sake of its root, and much in the same way as the carrot or parsnip. To produce large roots and of delicate flavour a very rich soil is required. The foliage of parsley is not merely of use for flavouring soups, &c., but is nutritious at the same time that it is stimulating, a quality which it seems to derive from an essential oil present in every part of the plant. Parsley contains also a peculiar gelatinous substance called *Apiine*. The bruised leaves of parsley are sometimes employed as a stimulating poultice. The seeds are a deadly poison to many birds, and when powdered they are sometimes used for killing lice.

Parsnip (*Pastinaca*), a genus of plants of the natural order Umbelliferæ, having compound umbels with neither general nor partial involucres; yellow flowers, with roundish, involute, sharp-pointed petals; calyx almost without teeth; fruit dorsally compressed and flat, with a broad border, the ridges very fine. The species are annual, biennial, or perennial herbs, with carrot-like, often fleshy roots and pinnate leaves. The Common Parsnip (*P. sativa*) is a native of England, although not of Scotland, and is abundant in some districts, particularly in chalky and gravelly soils. It is also found in many parts of Europe and of the north of Asia. It is a biennial, with angular furrowed stem, 2 to 3 feet high, pinnate leaves with ovate leaflets, rather shining, cut and serrated, and a three-lobed terminal leaflet. The root of the wild plant is white, aromatic, mucilaginous, sweet, but with some acridness; and injurious effects have followed from its use. Cultivation has greatly modified the qualities both of the root and foliage, rendering them much more bland. The parsnip has long been cultivated for the sake of its root, which in cultivation has greatly increased in size and become more fleshy. The flavour is disliked by some, as well as the too great sweetness, but highly relished by others; and the root of the parsnip is more nutritious than that of the carrot. The produce is also on many soils of larger quantity; and although the parsnip delights in a very open rich soil, it will succeed in clayey soils far too stiff for the carrot. It is rather remarkable that it has not been extensively cultivated as a field-crop, and for the feeding of cattle, except in the Channel Islands and in limited districts of continental Europe, more especially as cattle are very fond of it; and not only is the flesh of cattle fed on it of excellent quality, but the butter of dairy-cows fed on parsnips in winter is said by many to be superior to that produced by almost any other kind of winter-feeding. The mode of cultivation of the parsnip scarcely differs from that of the carrot. There are several varieties in cultivation. A very large variety called *coquaine*, cultivated in the Channel Islands on deep sandy soils, has roots sometimes 3 or 4 feet long; but this is fully twice the ordinary length, and there is a smaller turnip-rooted variety sometimes cultivated in gardens where the soil is very shallow. The parsnip is used chiefly in winter, whether for the table or for feeding cattle. It is improved rather than injured by frost, but is apt to become *rusty* if allowed to remain too long in the ground, and exhibits acrid qualities after it has begun to grow again in spring. The root of the parsnip is much used in the north of Ireland for making a fermented liquor with yeast and hops, and both in England and Ireland for making *parsnip wine*. A spirit is also obtained from it similar to that of the potato. Another species, the Cut-leaved Parsnip or Sekakul (*P. Sekakul*), having pinnatifid cut leaflets, a native of India, Syria, and Egypt, is cultivated in the Levant, and is very similar in its uses to the common parsnip.

Parson, the incumbent of a benefice in a parish. He is called parson (Lat. *persona*) because he represents the church for several purposes. See CLERGY.

Parson Bird. See HONEY-EATER.

Parsons, FATHER ROBERT, the chief of the English Jesuits in their golden age, and a man of remarkable talents and achievements, was born of respectable parents in Somersetshire in 1546. When eighteen years of age he passed from the free school at Taunton to St Mary's Hall, Oxford, and after two years migrated to Balliol College, where he took his degrees of bachelor and master, and became a fellow and tutor. Here he twice took the oath abjuring the papal supremacy, but he never received orders in the English Church. His enemies in college brought charges against him which led to his forced retirement from Oxford in 1574. He shortly afterwards became a Roman Catholic, and went to Padua with a view of there studying medicine, but, soon changing his mind, he set out on foot to Rome, and offered himself to the Society of Jesus, which he entered July 1575. He was ordained priest in 1578. When in the

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following year Dr (afterwards Cardinal) Allen, superior of the Douay seminary, succeeded in persuading the Jesuits to join with the seminary priests in the work of the English mission, Parsons and Campion (q.v.) were selected for the new venture. They left Rome in April 1580, with strict injunctions to meddle neither directly nor indirectly in affairs of state. Parsons landed at Dover, June 11, disguised as a merchant of jewels, in a coat of 'buff laid with gold-lace, with hat and feather.' His activity and success took both Catholics and Protestants by surprise. He employed six printers on a secret press, and by the rapidity of his movements for twelve months baffled all the attempts of the government to catch him. But soon after the apprehension of his companion, Campion, in July 1581, Parsons found it prudent to escape to the Continent, from which he never again returned to England.

Meanwhile, following the natural bent of his mind, and ignoring or evading his original instructions, he had busied himself with state intrigues, sounded the political dispositions of influential Catholic laymen when treating with them of their consciences, and thought out schemes for the subjection of England to the pope by force of arms. In Normandy, whither he at first retired, he had conferences with the Duke of Guise and with Father Creighton, who had been despatched by the pope into Scotland to negotiate with the Duke of Lennox for the liberation of the Queen of Scots; and a little later, during April and May 1582, he was at Paris conferring with the Provincial of the French Jesuits, the Archbishop of Glasgow, the papal nuncio, and the agent of the king of Spain, concerning a project for the invasion of England. The plan, which was chiefly the offspring of Parsons' brain, was carried by Creighton to the pope, and by Parsons himself to King Philip at Madrid. Now began his intimacy and influence with the Spanish king, and the series of political enterprises which culminated in the Armada of 1588. Affairs of state did not, however, exclusively occupy the Jesuit's active mind. At Rouen in 1582 he had finished his book, the *Christian Directory*, which has found favour with Protestant divines; and, with the aid of the Duke of Guise, he founded at Eu a seminary for youths in preparation for the colleges of Douay and Rome. For a short time in 1588 he was rector of the college at Rome; and after the failure of the Armada he organised seminaries or clerical establishments for his countrymen at Valladolid in 1589, St Lucar in 1591, Seville and Lisbon in 1592, and at St Omer in 1593. In the reaction which followed on the death of Allen (1595) the jealousy and suspicion with which the more loyal section of the clergy had for some time regarded the ambitious schemes of the Jesuits and the Spanish party developed into a scandalous quarrel. Disturbances broke out among the prisoners at Wisbeach and in the English college at Rome. Parsons, who went from Madrid to Rome to again assume the rectorship of the English college, now persuaded the pope to appoint George Blackwell (q.v.), a partisan of the Jesuits, as archpriest over the secular clergy, with the view of keeping the chief direction of affairs, political and ecclesiastical, in his own hands. The appointment was resisted by the leaders of the seculars with an animosity which threatened to create a schism. Parsons, upon whom the odium of the appointment chiefly fell, was accused of deceiving the pope, of tyranny over the clergy, and of continued treason against his country. The stringency of the penal laws against Catholics was laid at his door. An appeal carried to Rome by four delegates of the secular clergy led to a diminution of the Jesuits' power, though Parsons persisted to the end in resisting the endeavours of his opponents to obtain an episcopal government. He died at Rome, as rector of the English college, April 15, 1610.

His industry and power of work were extraordinary. He wrote English forcibly and lucidly, and was a master in the arts of controversy. His domineering spirit and political partisanship created for him bitter enemies, while his mode of prosecuting his ends justly exposed him to charges of double-dealing, equivocation, and reckless slander of his opponents. He was otherwise irreproachable in his private morals. His ambition was for his order and not for himself, and he modestly avoided the cardinal's hat. He knew how on occasions to exercise tact and prudence, and, when it was his purpose to do so, no one could write with more persuasive piety. Among the best known of his voluminous publications is *The Conference on the next Succession to the Crown*, written with the assistance of Allen and Sir Francis Englefield in favour of the infanta of Spain. He here insists on the right of the people to set aside, on religious grounds, the natural heir to the throne; and advocates principles which afterwards obtained for him the title of the first English Whig. Parliament (35 Eliz.) made it treason to possess a copy of the book, which was reprinted in the interests of Cromwell in 1648. It was again reprinted in 1681, and publicly burned at Oxford in 1683. Another curious work by Parsons, for some time disseminated in manuscript only, was his *Memorial for the Reformation*, in which he lays down rules for the guidance of the government, in the expected event of England's subjection to the pope. The book was read at dinner-time in the English college at Valladolid when Philip was preparing another Armada. The Jesuit's power of invective may be seen in his *Responsio ad Elizabethæ edictum*—a bitter libel on the queen's ministers in reply to the royal proclamation of November 1591. His *Apology* for the government of the archpriest (1601) is historically interesting, while his *Manifestation of the Great Folly and Bad Spirit of Certain in England calling Themselves Secular Priests*, a passionate attack upon the conduct and morals of his clerical brethren, exhibits him on his weakest side.

An impartial biography of this many-sided personality is still a desideratum. A brief sketch of his life and works will be found in Wood's *Athenæ* (ii. 83), and from other points of view in Dodd's *Church History* and Oliver's *Collections*. The best estimate of his character as a Jesuit missionary is that by Richard Simpson in his *Life of Campion*, where Parsons' career in England is fully traced. For his political intrigues between 1582 and 1595 the *Letters and Memorials of Cardinal Allen*, published by the Fathers of the Oratory, must be consulted. An account of his quarrels with the secular clergy will be found in the *Conflicts of Jesuits and Seculars in the Reign of Elizabeth*, by the present writer; and a number of letters and documents, with much miscellaneous information illustrating the whole period of his activity, are scattered through the volumes of Tierney's *Dodd* and Mr Foley's *Records of the English Province of the S. J.*

Parsonstown, or BIRR, a market-town in King's County, Ireland, on the river Brosna, 89 miles by rail W. of Dublin. The castle, anciently the seat of the O'Carrols, was granted by James I. to Laurence Parsons, ancestor of the present proprietor, the Earl of Rosse. Parsonstown is a handsome, well-built town, with a statue of the Duke of Cumberland, the victor of Culloden, and a bronze statue (1876) by Foley of the Earl of Rosse, the astronomer. Pop. 4955.

Parthenogenesis (from the Gr. *parthenos*, 'a virgin,' and *genesis*, 'production'), asexual reproduction. See GENERATIONS (ALTERNATION OF).

Parthenon (Gr., 'maiden's-chamber'), the temple of Athena (q.v.) at Athens, probably the

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most perfect specimen of Greek architecture. It is a great Doric temple, erected, under the superintendence of Phidias, by Ictinus and Callicrates, of Pentelic marble, with eight pillars in the width, and fifteen at each side (not counting those at the corners). The total length is 228 feet; height to top of pediment, 64 feet. This magnificent relic of Periclean times stood little injured by weather or war until, when it was being used as a Turkish magazine in 1687, a bomb from a Venetian mortar burst within, and the explosion reduced the building to its present ruined condition. Illustrations will be found at GREEK ARCHITECTURE; a view of the ruins at ATHENS; and part of the frieze at ELGIN MARBLES. See the Dilettanti Society's *Athenian Architecture* (1851; new ed. 1889).

Parthenopean Republic. See NAPLES.

Parthia, anciently a district in what is now northern Persia, lay between Media on the west and Bactria on the east, was separated from the Caspian Sea on the north by the savage land of Hyrcania, and was bordered on the south by the Iranian deserts. The Parthians were of Scythian descent, immigrants and nomads, who eventually adopted the Median dress and a semi-Aryan speech. But in war they clung to their national habits: they always fought on horseback, and both horse and rider were clad throughout in scale armour; their weapons were bows and arrows, which they discharged backwards during pretended flight as well as forwards in direct attack. Their armies were made up principally of slaves, commanded by their masters, the aristocratic nucleus of the Parthian nation. Parthia was subject successively to the Assyrians, the Medes, Persians, Greeks (Alexander the Great and his generals), and the Seleucids of Syria. In or about 250 B.C. a chief named Arsaces founded an independent kingdom in Hyrcania; his brother and successor, Tiridates, established himself in Parthia in 241 B.C. But the early kings of Parthia had much ado to maintain their position against their suzerains, the Seleucid 'great kings;' and it was not until Mithridates I. (171–138) ascended the throne, and had subdued Bactria, Media, and Babylonia, that the Parthian princes shook off completely the Syrian (Greek) yoke and became independent. This king made Parthia supreme in Iran. He greatly strengthened his power by resting it in great part upon the Magi (q.v.) and the ancient creed of Zoroaster. In the reign of his successor the Seleucid king made a determined effort to recover the lost provinces in Iran, but the expedition cost him his life and his army (129 B.C.). No sooner was this enemy disposed of than another and more formidable foe appeared in the east—the Scythians. They defeated and slew (128) Phraates, king of Parthia, levied tribute from his kingdom, and established themselves within its borders. During the first half of the 1st century the Parthian kings, by interfering in the affairs of Armenia, first came into contact with the Romans. The unprovoked invasion of Mesopotamia by Crassus (53 B.C.), his disastrous defeat and his death, make the first act in the drama of real contest that then ensued between Rome and Parthia. The remaining acts were the conquest of Syria and Palestine by Parthia (40–38); the disastrous campaign of Antony in Armenia (36 B.C.); then, after a century and a half of, in Parthia, mostly internal dissensions, the renewal of hostilities by Trajan (115–117 A.D.); the brilliant campaign of Avidius Cassius (164–165); the capture of Ctesiphon by Severus (199) and his repulse before Atra (201); and the defeat of Macrinus, the Roman emperor, and his ignominious payment of fifty million denarii to his enemy (217–218). During nearly all this period the Euphrates was looked upon by both combatants as the frontier line between their respective empires. The Parthian capital was Ctesiphon, a suburb or twin-capital with Seleucia, all through the duel with Rome. The Parthian empire was overthrown in a battle fought in 224 (or 227) by Ardashir, a prince of Persis, a province of ancient Iran, who founded the subsequent dynasty of the Sassanids (see PERSIA). The Parthian kings during the most flourishing period of their power used Greek as their official language, adopted some of the Greek deities, and in other ways put themselves under the influence of Greek civilisation. But the hold of this civilisation grew weaker as time went on, and Greek ceased to be the official language in the 2d century A.D.

See histories of Parthia by Rawlinson (1873), Schneiderwirth (Heiligenstadt, 1874), and Spiegel (Leip. 1887).

Partick, a town of Lanarkshire, prettily situated, chiefly on a rising ground on the Kelvin, immediately above its junction with the Clyde, and 3 miles WNW. of the Cross of Glasgow, of which city it now forms a suburb. Nine-tenths of the workmen of Partick are engaged in shipbuilding-yards, but there are also many flour-mills, cotton-factories, and bleach-fields. A large proportion of the inhabitants are engaged in business in Glasgow, and for their accommodation extensive ranges of handsome villas have been built here. Partick was made a police-burgh in 1852–66. Pop. (1851) 3131; (1881) 27,410; (1891) 36,538. See Wallace's *Parish of Govan* (1877).

Partinico, a town of Sicily, 32 miles SW. of Palermo by rail. Pop. 21,000.

Partnership is the relation which subsists between persons carrying on business in common with a view to profit. Technically it has no reference to the relation between shareholders and a limited company. The law of partnership for the United Kingdom has been placed on a clear and intelligible footing by the Partnership Act, 1890, 53 and 54 Vict. chap. 39, which does not change the law established by decisions, but states it in an authoritative manner. Joint tenancy, or joint property, or sharing gross returns does not by itself make a man a partner. The receipt of a share of net profits is a strong indication of partnership, but it is not conclusive in such cases as a creditor, a servant or agent, the widow or child of a deceased partner, the vendor of the good-will of a business, receiving payment or remuneration by way of a share in net profits. Where the person carrying on the business becomes bankrupt, however, the creditor or vendor who is paid out of profits is postponed to the other creditors. In Scotland the firm is a legal person distinct from the individual partners, but a partner may be charged on a decree against the firm, and on payment of a firm debt is entitled to relief *pro rata* from the firm and the other partners. In all ordinary transactions each partner, as agent, binds the firm, unless the person dealt with knows that the partner has in fact no authority. The firm is not bound where the partner pledges its credit for a purpose apparently not connected with the business. In England and Ireland the partners are liable jointly, in Scotland severally, for firm debts: in England and Ireland the estate of a deceased partner is subject to prior payment of separate debts. The firm is liable for the misapplication by a partner of property received by the firm, except in the case of property of which the partner is trustee when the other partners have no notice of the trust. Every person who by words or conduct holds himself out as a partner, or permits himself to be so represented by others, is liable to anybody who relied on such representations. But this will not make the executors of a deceased partner liable because the name

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of the deceased has been used by the firm after his death. The admissions of a partner bind the firm, and notice of any fact to a partner is also notice to the firm, except in the case of a fraud upon the firm. A new partner does not become liable, nor does a retiring partner cease to be liable, to existing creditors. But the consent of creditors to discharge a retiring partner, or to accept the new firm as the only debtor, is easily presumed from a course of commercial dealing. Continuing guarantees or cautionary obligations are revoked as to future transactions by any change in the constitution of the firm which is debtor or creditor in the obligation. Unless the contrary appears, property bought with the money of the firm is held to have been bought on account of the firm. Heritable property bought for the firm is treated as movable between partners. Unless otherwise agreed, all partners are entitled to share equally in profits and capital, and must contribute equally to losses. The firm must indemnify every partner in respect of proper payments made and liabilities undertaken by him. If a partner advances capital beyond his share, he is entitled to interest at 5 per cent. Every partner may take part in management, but no partner is entitled to remuneration for so doing.

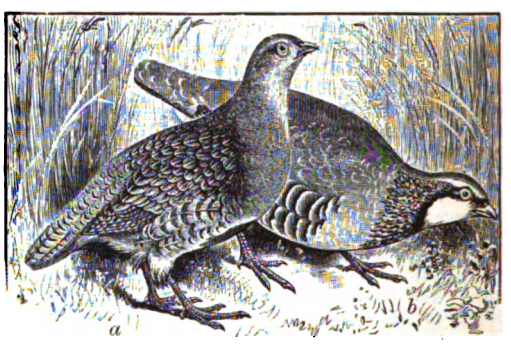
No new partner may be introduced without the consent of all the other partners. The majority of partners cannot expel a partner. Every partner has access to the firm books. If no time has been fixed for the duration of the firm, any partner may at any time dissolve it by notice to his copartners. If the partners go on trading after the time fixed for dissolution they are presumed to do so under their former agreement so far as that may be applied to a partnership at will. Every partner must account to the firm for any benefit derived by him from any partnership transaction, or any use of partnership property or business connection. The same rule applies if without consent a partner carries on a separate business competing with the firm. An assignation by a partner to his creditor of a share in the business does not entitle the creditor to inspect books, or to require accounts, or to interfere in management, but merely to receive share of profits, or to receive the value of the share when realised on dissolution. Apart from agreement, partnership is dissolved by the death or bankruptcy of any partner, or by the business becoming unlawful. Further, the court may decree a dissolution (1) where partner is of permanently unsound mind; (2) when partner becomes permanently incapable of performing his duties; (3) when partner's conduct prejudicially affects the carrying on business; (4) when partner persistently breaks the agreement, or so conducts himself that it is not reasonably practicable for the other partners to act with him; (5) when the business can only be carried on at a loss. A person dealing with a firm after change in its constitution is entitled to treat all *apparent* members of the firm as still partners until he receives notice of the change. A retiring partner, not known to be a partner, is not liable for debts contracted after his retirement. After dissolution the authority of partners to bind the firm continues so far as necessary for a proper winding up—viz. in having the property of the partnership applied to payment of the debts and liabilities of the firm, and the surplus assets applied in payment of what is due to the partners after deducting what is due by the partners to the firm. If after a partner's death or retirement the other partners carry on business without any settlement of accounts, they must account for share of profits or pay interest at 5 per cent. in the option of the outgoing partner or the representatives of deceased partner. An option to purchase, however, is generally given by the contract in such cases.

In Scotland, as already stated, the firm is a distinct *persona*. Therefore in actions by or against the firm the individual partners need not be named, though in practice one or two of them generally are named. Each partner may also sue the firm; and the firm may be sequestrated without any of the partners being sequestrated.

The law of the United States is based on English common law, but many of the states of the Union have their own special legislation; and, contrary to the practice of Britain, *limited* partnerships, resembling the French Sociétés en Commandite (see COMMANDITE), are fully recognised. On this subject the New York legislation has been generally followed; the *general* partners being responsible, the special partners liable only to the extent of the funds put by them into the concern. Creditors cannot directly proceed against the representatives of a deceased partner.

See Sir N. Lindley's *Treatise on the Law of Partnership* (6th ed. 1891), the great authority; also J. Parsons' *Exposition of the Principles of Partnership* (1889); F. Pollock's *Digest of the Law of Partnership* (4th ed. 1888); and, for the United States, Kent's *Commentaries* (13th ed. 1884), and Story, *Law of Partnership* (1841). See also the articles COMPANY, CORPORATION.

Partridge (*Perdix*), a genus of gallinaceous birds, of the family Tetraonidæ, having a short, strong bill, naked at the base; the upper mandible convex, bent down at the tip; the wings and tail short; the tarsi as well as the toes naked, the tarsi not spurred. The Common Partridge or Gray Partridge (*P. cinerea*) is the most plentiful of all game-birds in Britain, and becomes increasingly plentiful as cultivation is extended, whilst the range of the moorfowl is restricted. Hence it has



a, Common Partridge (*Perdix cinerea*); *b*, Red-legged Partridge (*P. rufa*).

greatly increased during the 19th century in Britain, and, though not preserved to the same extent as are pheasants, it affords considerable sport. It is not found in the Outer Hebrides. On the continent of Europe it is abundant in almost all districts suitable to its habits, from Scandinavia to the Mediterranean, and is found also in the north of Africa, and in some parts of the west of Asia. It varies considerably in size, those found in rich arable lands being generally the largest, and about 12½ inches in entire length, whilst those which inhabit poorer and more upland districts, or where heather abounds, are rather smaller. The female is rather smaller than the male. The upper parts of both are ash-gray, finely varied with brown and black; the male has a deep chestnut crescent-shaped spot on the breast, which is almost or altogether wanting in the female. A variety called the Mountain Partridge has the plumage brown. The Partridge is seldom found far from cultivated land. It feeds on grain and other seeds, insects and their larvæ and pupæ; and the pupæ of ants

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are generally the food sought at first for the young. The nest is usually on the ground, among brushwood and long grass, or in fields of clover or corn, and generally contains from twelve to twenty eggs. The young run as soon as they are hatched. Both parents show a very strong attachment to their young, and great courage in repelling assailants; they have also recourse, like many other birds, to stratagem to draw off the most powerful and dangerous enemies, such as dogs, in another direction, fluttering close before them as if broken-winged, whilst the brood escape. Until the end of autumn the parent birds and their brood keep together in a *covey;* late in the season several coveys often unite into a *pack,* when it becomes much more difficult for the sportsman to approach them. The flight of the partridge is strong and rapid for a short distance, but it does not seem to be capable of a long-sustained flight. The eggs of partridges are often hatched, and the young birds reared, by the domestic hen, the chief requisite being a plentiful supply of ants when the birds are very young. Partridges thus reared become very tame, but they seldom breed in the aviary.

The Red-legged Partridge (*P. rufa* or *Caccabis rufa*, the genus or sub-genus Caccabis being distinguished by a rudimentary blunt spur on the tarsi) is a native of the south of Europe and of the Channel Islands, often called the French Partridge. It is now also plentiful in some parts of England, particularly Norfolk and Suffolk, into which it has been introduced, and whence it has largely driven out the common breed. It is said to have been brought to England from Guernsey during the reign of Charles II.; and the French Revolution of 1789, with its sudden abolition of the game-laws, is said by Carlyle to have caused 'two signs—emigrant flights of French seigneurs, emigrant winged flights of French game.' The red-leg is rather larger than the common partridge, stronger on the wing, and less easily approached by the sportsman, whilst it is also less esteemed for the table. The upper parts are of a reddish-ash colour; the throat and cheeks white, bounded by a collar of black, which expands in black spots on the breast; and the sides exhibit bars of black. The plumage is smooth. Two other species, nearly allied to this, are found in some of the southern parts of Europe. India has a number of species. The habits of all the species much resemble those of the common partridge, but the *P. rufa* prefers heavy clay land and heaths, in which respect it greatly differs from the gray partridge.—The name partridge is sometimes loosely used so as to refer to the North American species of Grouse (q.v.) and various species of Ortyx (see VIRGINIAN QUAIL), and in South America is sometimes given to the Tinamou (*Rhynchotus*).

Partridge Berry. See GAULTHERIA.

Partridge-wood, a very pretty hardwood from the West Indies and Brazil; the product of the leguminous tree *Andira inermis.* See ANDIRA.

Pasadena, a pretty country town in southern California, 10 miles by rail E. of Los Angeles. It has a great hotel with accommodation for 500 people, and a pop. of about 12,000.

Pasar'gadæ, one of the most ancient cities of the Persians, containing a palace and great treasures, was in the province of Persis, and stood in a plain surrounded by mountains, on the river Cyrus. It is identified with ruins near the modern Murghab, north-east of ancient Persepolis, and 70 miles north-east of the modern Shiraz.

Pascagoula, a navigable river in the south-eastern part of Mississippi, and formed by the junction of the Leaf and Chickasawha. It flows 85 miles south to a small bay of the same name on the Gulf of Mexico.

Pascal, BLAISE, one of the best writers and profoundest thinkers France has produced, was born of a good legal family, at Clermont-Ferrand in Auvergne, 19th June 1623. His father, Étienne Pascal, was a president of the Court of Aids there, and was himself a man of high character and capacity; his two surviving sisters, Gilberte and Jacqueline, grew up beautiful and accomplished women, with something of their brother's intellect and all his spiritual elevation of character. The elder of the two, Gilberte (born 1620), married her cousin M. Périer in 1641, penned a tender and touching sketch of her brother's life, as well as her sister's, and had her own history written by her gifted and austere daughter Marguerite (1646–1733). Jacqueline (born 1625) wrote verses as a child, and in maturer life remarkable letters and *Thoughts* on the 'Mystery of the Death of Christ.' After a troubled spiritual experience she became one of the sisters of Port Royal in 1652, but failed to find all the happiness she sought for, and died nine years later, immediately after having been persuaded into subscribing against her conscience the formulary required from the Port-Royalists, which she had vehemently resisted as a treasonable betrayal of the cause. Her brother, at first willing to submit, now offered the strongest opposition to any further concessions, and, at an interview with Arnauld, Nicole, and Sainte-Marthe, argued the point with such vehemence that he fell fainting to the ground.

Their mother died in 1626 or 1628, and in 1630 their father went to live in Paris amongst the men of science of his time. He trained his gifted son with the greatest care, and Madame Périer has told us of the child's astonishing precocity, how he refused to rest without knowing the reason for everything, and how, when purposely kept from mathematical books, he worked out for himself at twelve the propositions of Euclid as far as the thirty-second in the first book. Still more, at sixteen he wrote a treatise on conic sections which called forth the mingled incredulity and astonishment of Descartes, and indeed forms the foundation of the modern treatment of the subject. It was never published, but Leibnitz saw it, and Pascal himself gave a résumé of it in his *Essai pour les Coniques* (1640). His father's protest against one of Richelieu's financial measures brought him into trouble, and indeed drove him awhile into hiding, but the cardinal's anger was abated by the intercessions of Jacqueline and her charming acting in a representation by young girls of Scudéry's *L'Amour Tyrannique.* Richelieu sent him as Intendant to Rouen in 1641, and here about 1646 an accident brought him into contact with the Jansenists, and turned into a new current the destinies of his children. Here the boy gave himself to study with unbroken devotion, despite wretched health and almost incessant sufferings from nervous prostration. To this period belongs his first conversion, and we find him in the intemperate zeal of a first love testifying to the earnestness of his convictions by denouncing to the archbishop the errors in the teaching of a Capuchin monk at Rouen. In 1647 he published his *Nouvelles Expériences sur le Vide,* and next year occurred his famous Puy de Dôme experiments on atmospheric pressure, which may be said to have completed the work of Galileo and Torricelli. The reputation he gained earned him the jealousy of Descartes, and the attacks of the Jesuit fathers of Montferrand and Paris.

His calculating machine was a brilliant achievement of the first years at Rouen; the later scientific labours of his life were contributions to the infinitesimal calculus, to the theory of the equilib-

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rium of fluids, the mathematical theory of probability, and the properties of the cycloid. In the very last months of his life we find him busily engaged in a scheme for running omnibuses on the streets of Paris.

In the autumn of 1647 he returned to Paris, and we find him frequently accompanying Jacqueline in her visits to the church of Port Royal. Next year their father returned to Paris as Councillor of State, and took the pair to Clermont for nearly two years. In September 1651 he died, and Jacqueline, now free to carry out her desire, joined Port Royal in the January of 1652. From some of her exaggerated phrases Pascal has been needlessly supposed to have lived a worldly life with the Duc de Roannez and other friends, and his *Discours sur les Passions de l'Amour* has been interpreted as inspired by a hopeless passion for Charlotte Gouffier de Roannez, the duke's sister, then about sixteen years old. Certain it breathes a genuine passion throughout, and there can be little doubt that it was written out of some real experience. If Pascal did love her, it is most probable that he never told his love, for he continued to the close the warm friend and correspondent of herself and her brother alike. She vacillated awhile between the cloister and the world, passed through her novitiate at Port Royal, then married the Duc de la Feuillade, saw her children die and her own health decay, and early sank into the grave.

In the autumn of 1654 Pascal's second conversion occurred, and from this period date those severe and gloomy austerities which darkened his life and doubtless hastened him to the grave. The immediate occasion may have been a narrow escape from death through his horses running away when driving to Neuilly, but the moment that remained ever sacred in his memory was that of a remarkable vision or ecstasy, November 23, 1654, commemorated in a few broken sentences of impassioned and mystical devotion in his Profession of Faith, or Amulet, as Condorcet called it, which was found after his death, copied in his own handwriting both on paper and parchment, and sewn into his doublet, being apparently stitched anew into every change of clothes. (See, but only for its facts, Lélut's *L'Amulette de Pascal*, 1846.) From this time a complete change passed over his life; he subjected himself to the most rigid mortifications, complete denial of self, boundless charity, and absolute obedience to his spiritual director, and ever wore around his body a girdle of iron, the sharp points of which he would press into his flesh when he felt in danger from worldly temptations or wandering thoughts. For a time he lived in Port Royal, and henceforth he threw himself with a passionate devotion into its cause. Arnauld was condemned by the Sorbonne in 1655, not merely for doubting whether the famous Five Propositions condemned were actually contained in the work of Jansen, but also for asserting the identity of the Augustinian and Jansenist doctrines of *gratia efficax*, and for declaring that the arguments used against the *Augustinus* were themselves erroneous or falsified; and his friends now thought the time had come for the public to be informed about the whole question at issue.

In a happy hour Pascal was induced to lend his pen to the cause, and on the 23d January 1656, in the interval between the first and second judgment of the Sorbonne on Arnauld, appeared *A Letter written to a Provincial by one of his Friends.* A second was issued a few days later, and as its successors followed he assumed the pseudonym of 'Louis de Montalte.' These 'little letters'—the greatest tracts for the times that were ever issued—flew from hand to hand, and the rage and fury of the Jesuits knew no bounds. Never before had been seen in the whole range of controversy such delicate yet scathing irony, such lightness of touch yet keenness of thrust, such Socratic directness and point, such mastery of incisive argument wedded to perfect grace and felicity of phrase and rare distinction of style. 'The best comedies of Molière have not more wit than the first Provincial Letters,' says Voltaire, and he adds, 'Bossuet has nothing more sublime than the concluding ones.' Voltaire tells us that Bossuet himself confessed that had he not written his own, he would rather have written them than any other book he knew; even Madame de Sévigné bowed her head before their sovereign delicacy and perfection of style; Boileau owned them unsurpassed in ancient or modern times; Perrault places them above Plato for wit, Lucian for delicate and artful raillery, and Cicero's orations for strength and ingenuity of reasoning; and Gibbon tells us that almost every year he perused them with fresh pleasure, and from them learned 'to manage the weapon of grave and temperate irony, even on subjects of ecclesiastical solemnity.' There are altogether eighteen Letters from the pen of Pascal himself, a brief fragment of a nineteenth ascribed to him, and a twentieth on the Inquisition from the pen of M. Le Maitre. The first two deal with the special question between Arnauld and the Sorbonne; the third and two concluding letters are closely connected with these; the intervening thirteen (4–16) open up the whole subject of the moral theology of the Jesuits, and form the most formidable attack ever made upon the order. The fabric of the moral theology or casuistry of the Jesuits, with all its subtle equivocations and refinements for the extenuation of sin, appalled the austere soul of Pascal as he read into it; and by the end of the tenth letter, after completing his exposition of their theology, he turns to address the Jesuit fathers directly, and breaks into language of eloquent and indeed sublime denunciation. The eleventh defends the application of the method of raillery to serious subjects; the twelfth and thirteenth rise to an eloquence equalled only in Demosthenes; the sixteenth is that the length of which he excuses because he had not had time to make it shorter. In the composition of his Letters Pascal owed much to the materials collected in the Port Royal work, *La Théologie Morale des Jésuites* (1644). His quotations were confessedly often furnished for him from the wider reading of friends like Nicole and Arnauld, but he tells us that he himself read Escobar's seven volumes twice through, and never made use of a single passage supplied to him without having specially examined it and its context. It has been charged against him that he sometimes quotes inexactly, and that he is unfair in taking quotations out of their setting, but the real grievance of his adversaries is nothing more than this, that he turns their flank by taking their own positions and developing them practically to their natural conclusions. And if it be said that he treated with too great seriousness the statements and arguments of inferior writers, it must be remembered that all these books were issued under the *imprimatur* of the order. At anyrate the Jesuits were much readier with denial and denunciation than counter-arguments and proof; the replies of Pirot (1657), Daniel (1694), and Dumas (1700) were pitiful failures, and hardly more can be said of the onslaught of Joseph de Maistre (in *De l'Église Gallicane*, 1821) and of the Abbé Maynard's edition of the Letters with a professed refutation (1851). Pascal's own final judgment of his work was expressed in these solemn words: 'Though my Letters be condemned at Rome, what I condemn in them is condemned in Heaven. Ad tuum, Domine Jesu, tribunal appello.'

Between his conversion and the beginning of his

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great controversy Pascal seems to have lived chiefly at Port Royal under the spiritual guidance of M. de Saci, but he never took up his abode as a regular inmate there. His Letters occupied him till the spring of 1657, and during the following year he busied himself in a scheme for a great Apology of religion, his faith meanwhile being quickened by his belief in the famous Miracle of the Holy Thorn, according to which his niece, Marguerite Périer, a pupil at Port Royal, had been miraculously cured of an obstinate *fistula lacrymalis* by a touch of a fragment of the crown of Christ. But his health gave way during 1658, and thenceforward to the close he bore the burden of constant suffering with more than saintly patience and resignation. Indeed he laboured to deaden every sensation of pleasure in life, in his food, his studies, and even the affections of his friends. Meanwhile his weakness grew upon him, study and composition became possible only in brief intervals, and on 19th August 1662 he sank to rest under his sister's roof at Paris, his own house having been given up to a poor family one of whose children had been seized with smallpox.

Seven years later (1669) appeared his *Pensées*, with a preface by Madame Périer's son—the result of the editorial labours on his fragmentary papers of a committee of influential Jansenists. Unhappily these perplexing fragments were garbled to a great extent in the interests of orthodoxy and ecclesiastical policy by exaggerated prudence and misdirected zeal, just as they were in 1776 by Condorcet in the interests of heterodoxy. The Abbé Bossut's edition in 1779 was long accepted as authoritative; but in 1842 Cousin first showed the real state of the case in his celebrated Report to the French Academy, and startled the world by declaring that Pascal was a complete sceptic in philosophy, and a Christian only through external influences entirely unconnected with logic or reason. To M. Prosper Faugère belongs the honour of first giving (1844; Eng. trans. by Pearce, 1850) a complete and authentic text, although all readers will not accept his supposed discovery of the indications of an interior arrangement. Havet, in his edition (1852; 2d ed. 1866), thinks it hopeless to discover the true order, and therefore returns to Bossut's arbitrary but familiar arrangement. Victor Rochet, again (1873), adopts an elaborate arrangement, professedly founded on Pascal's original plan, and maintains that everything falls naturally into it. The best edition is that of M. Molinier (2 vols. 1877–79), an independent arrangement mainly on the lines of Faugère's. It is this last version which has been admirably translated into English by C. Kegan Paul (1885).

Pascal's *Pensées* are detached thoughts dashed rapidly off, intended as materials to be shaped into his projected Apology for the Christian faith. They are thrilled through and through with passionate emotion and ever-present personality, and they contain some of the most profound, suggestive, and startling thoughts that have ever been expressed on the greatest mysteries within the range of human speculation. From one point of view it is easy to construct from them, as Cousin did, a theory that their author was a pessimist and sceptic of a far deeper dye than Montaigne, but profounder study proves this view but a shallow paradox at best. The conversation with De Saci (first published in 1728 by Des Molets) offers the best key to Pascal's philosophy of life. Here he takes Montaigne and Epictetus as his representatives, the first of the Pyrrhonist, Epicurean, and sceptic, who mocks man's aspirations after spiritual truth, and insists upon his weakness, his ignorance, and doubt; the second, of the Stoic, who looks at man only on his lofty side, insists on his freedom and moral dignity, and points out in his moral nature the image and likeness of God. Pascal regards these two opposites as united in the gospel of Christ, the overwhelming certainty of which arises out of its alone affording a key to the tormenting anomalies and contradictions of nature, at once to the moral law as revealed by conscience within and to all the disorder of the world as discovered by conscious experience—to man's greatness and man's degradation, and the reason for both the one and the other. Man's spiritual capacity alone enables him to realise his intrinsic greatness, which was revealed to him once for all when for his sake the Highest was joined to the lowest, in the incarnate union of Divine Power and Love with human degradation and pain. This is a mystery beyond man's power of demonstration, and a deeper ground for certainty must be sought in its essential correspondence, not with the intellect alone, but with the whole complex nature of man. Yet with all this there exist in the *Pensées* startling fragments deeply tinged with scepticism, although many of these may be interpreted with Sainte-Beuve as a kind of shorthand notes to fix ideas that flashed across his mind of difficulties to be afterwards considered. Of these none is more famous than the wager essay, in which, as has been said, and with truth, Pascal plays at pitch and toss with the existence of God and the immortality of the soul. Such a passage as this is a product, says Tulloch, of one of those 'moments of terrible doubt, when the soul is so borne away on the surge of the sceptical wave that rises from the depth of all human speculation that it can only cling to the Divine by an effort of will, and with something of the gamester's thought that this is the winning side.' The *Pensées* owe much to Montaigne and Charron, and, as Molinier has shown, to the 13th-century Spanish writer Raymond Martin.

The only complete editions of Pascal's works that need be mentioned are those of Bossut (1779), Lahure (1858), and Faugère (8 vols. 1886 *et seq.*). Of the *Provincial Letters*, besides the Abbé Maynard's edition (1851) already mentioned, and M. Lesieur's reprint of the original quarto (1867), there are editions by Villemain (1829), De Sacy (1877), De Soyres (Lond. 1880), L. Derome (1885 *et seq.*), and Molinier (2 vols. 1891). The famous Latin translation by Wendrock [Nicole], for which he read his Terence thrice over, appeared at Cologne as early as 1658. There are English translations by Royston (1657), Pearce (1849), and Dr M'Crie (1846). Of the *Pensées* there are editions by Frantin (1835), Faugère (1844, containing what seems to be the most authentic portrait), Havet, with an admirable commentary (1852; 3d ed. 1881), Lahure (1858), Louandre (1854), Rochet (1873), and Molinier (1877–79). English translations are those by Walker (1688), Craig (1825), Pearce (1850), and Kegan Paul (1885). For Jacqueline Pascal's Life, see the works by Cousin (1845) and Sophy Winthrop Weizel, *Sister and Saint* (New York, 1880). Her miscellaneous writings, letters, and poems, together with those of Madame Périer and Marguerite Périer, were edited by Faugère (Paris, 1845).

See vols. ii. and iii. of Sainte-Beuve's *Port Royal* (1842–48), and Charles Beard's *Port Royal* (1861); the studies by Reuchlin (Stutt. 1840), Vinet (1856), Cousin (1857), H. Weingarten (Leip. 1863), Dreydorff (admirable, Leip. 1870), Tulloch, in 'Foreign Classics' (1878), and Joseph Bertrand (1891). Admirable articles on Pascal are those in the *Edinburgh Review* for January 1847 (by Henry Rogers), the *Quarterly Review* for October 1879, the *British Quarterly Review* for October 1884 (by C. Kegan Paul), and Dean Church in *Companions for the Devout Life* (1875). See also the articles ARNAULD, JANSEN, and PORT ROYAL in this work.

Paschal. See PASSOVER, EASTER, HOLY WEEK.

Pasco. See CERRO DE PASCO.

Pas-de-Calais (Fr. for Strait of Dover), a department in the north of France, formed out of Artois and Picardy, and bounded on the W. by the Strait of Dover and the English Channel. Area, 2550 sq. m.; pop. (1861) 724,338; (1886) 853,526. The surface is level, with the exception of a low ridge running to the north-west, and ending in

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Cape Gris-nez (q.v.). The soil is fertile, mostly under cultivation, and watered by numerous short rivers, the majority of which are navigable and connected by canals. The coast-line is 80 miles in length, and the shores are in certain parts low and sandy. The climate is exceedingly inconstant. Fishing is actively carried on, particularly in the neighbourhood of Boulogne. Coal, iron, and other minerals are raised and worked, and considerable quantities of turf are cut. The industrial establishments are numerous and important, as iron-foundries, beet-root sugar factories, glass-works, potteries, tanneries, and others. Boulogne and Calais are the principal harbours. There are six arrondissements—Arras, Béthune, St Omer, St Pol, Boulogne, and Montreuil. The capital is Arras.

Paseng. See GOAT.

Pasewalk, a town of Prussia, 26 miles by rail WNW. of Stettin, has varied industries. It was plundered and burned three times by the Imperialists in the Thirty Years' War, by the Poles in 1657, and by the Russians in 1713. Pop. 9514.

Pasha' (spelt also *pacha* and *bashaw*), a title, derived from the Persian, used in the Ottoman empire, and applied to governors of provinces, or military and naval commanders of high rank. The title was limited in the early period of the Ottoman empire to the princes of the blood, but was subsequently extended to great officers of the empire. The three grades of pashas used to be distinguished by the number of the horse-tails—three, two, or one—borne before them as their standards. This antique system was abolished by Mahmud II., but the three ranks still survive. Every general is *ex-officio* a pasha, so is every vali or governor of a province. The Sheikh-ul-Islam, on the other hand, is never a pasha, but only an effendi.

Paskevitch, IVAN FEODOROVITCH, Count of Erivan and Prince of Warsaw, a Russian field-marshal, was born at Poltava, May 19, 1782. He was educated in the school of pages, entered the army, served against the French in the campaign in 1805, which was ended by the defeat of Austerlitz, and afterwards against the Turks. Then he took a prominent part in the campaign of 1812, especially in the battles of Smolensk, Borodino, Leipzig, and in the capture of Paris. In 1826 he was appointed commander-in-chief against the Persians, whom he completely defeated, conquering Persian Armenia, taking Erivan, and ending the war by a peace (1828) exceedingly favourable to Russia. In recompense for these services he was created Count of Erivan, and received a grant of £100,000. In 1828 and 1829 he made two campaigns against the Turks in Asia, took Kars, Erzerûm, and other fortresses, and terminated the war by the treaty of Adrianople in 1829. In 1831 he suppressed the rising in Poland by capturing Warsaw, and was made governor of the reconquered country. Under his rule Poland was (1832) definitively incorporated as Russian territory. When the Hungarians took up arms in 1848 Paskevitch was sent to the assistance of Austria, and, after defeating the Hungarians in several battles, compelled Görgei to surrender at Vilagos (1849). In 1854 he took command of the Russian army on the Danube; but fortune, which had hitherto invariably smiled upon him, deserted him at Silistria, where he was wounded. Thereupon he resigned the command, retired to Warsaw, and died 1st February 1856. See Life by Tolstoi (Paris, 1835), and Schterbatoff (St Petersburg, 1888), both in French.

Pasque Flower. See PULSATILLA.

Pasquinade, an anonymous or pseudonymous publication of small size, sometimes printed, sometimes only posted up or circulated in manuscript, and having for its object the defamation of a character, or at least the turning of a person to ridicule. The name is derived from *Pasquino*, a tailor remarkable for his wit and sarcastic humour, who lived in Rome towards the close of the 15th century, and attracted many to his shop by his sharp and lively sayings. Some time after his death a mutilated fragment of an ancient statue, considered to represent Menelaus supporting the dead body of Patroclus, was dug up opposite his shop, and placed at the end of the Braschi Palace, near the Piazza Navoni. It was named after the defunct tailor, and the practice originated of affixing to it placards containing satires and jests relative to the affairs of the day—the pope and the cardinals being favourite victims of the invisible satirists. See a French monograph by Mary Lafon (2d ed. 1877).

Passage, BIRDS OF. See BIRDS, Vol. II. p. 172.

Passaglia, CARLO, a Catholic theologian, was born of humble parents at Lucca, 2d May 1812, was trained a Jesuit, and in 1844 became professor in the Collegio Romano. He was eminent alike for his learning and eloquence. During the troublous times of 1849–51 he taught in a Jesuit college in England. In 1855 he published an elaborate treatise on the doctrine of the Immaculate Conception, but ere long he resigned his chair, and in 1859, leaving the Society of the Jesuits, entered warmly into the discussions as to the temporal power of the pope, and wrote a famous pamphlet, *Pro Causa Italica ad Episcopos Italianos*. The result was that he had to withdraw to Turin, where he edited the *Mediatore* and became professor of Moral Philosophy. At Turin he died, 12th March 1887.

Passaic, a city of New Jersey, on the Passaic River, 11 miles by rail NW. of Jersey City. Besides foundries and print-works, it has manufactories of woollens and shoddy, whips, india-rubber, chemicals, &c. Pop. (1890) 13,028.

Passamaquoddy Bay, in North America, opens out of the Bay of Fundy, at the mouth of the St Croix River, between Maine and New Brunswick. It is 15 miles long by 10 wide, and shut in by a cluster of islands so as to form an excellent harbour.

Passarowitz, or more correctly POSHAREWATZ, a town of Servia, 9 miles S. of the Danube and 40 SE. of Belgrade. Pop. 9394. Here was signed, July 21, 1718, the treaty between Venice and the emperor, on the one side, and the Porte on the other, by which a truce of twenty-five years was established, and the Banat of Temesvar, the western portion of Wallachia and Servia, Belgrade, and part of Bosnia were secured to Austria.

Passau, a town of Bavaria, stands on a rocky tongue of land, on the right bank of the Danube, beside the influx of the Inn, and opposite the confluence of the Ilz with the Danube, close to the frontier of Austria, and 72 miles by rail SE. of Ratisbon. The city proper is connected with its suburbs on the other side of the Inn and the Danube by means of iron bridges; and picturesque hills encircle the whole town. The cathedral was rebuilt after a fire in 1680; the bishop's palace is now in part converted into public offices. The Passau Agreement between the Roman Catholic and Protestant estates of the empire was signed here on 29th July and 15th August 1552. Passau was long an important fortified post, being looked upon as the key of the Danube in that part of its course. There were two strong citadels, one dating from 737, the other from 1215–19, besides other fortified works. The town grew up around an old Roman camp,

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and in 739 was made the seat of a bishopric founded by St Boniface. The town came into the hands of Bavaria in 1803. It has important manufactures of leather, porcelain, and parquet-floors, besides boats, metal-ware, and mirrors, and considerable trade in salt, timber, corn, and Passau tiles (made at Obernzell). Pop. 15,583.

Passenger Pigeon (*Ectopistes migratorius*), a species of pigeon, a native of North America. The genus to which it belongs has the head small, the bill short, the tail very long and wedge-shaped, the wings long and pointed. The male of the passenger species, generally known in North America as the Wild Pigeon, is about 16½ inches long, the tail increasing the length to 25 inches. The colour is grayish blue above, breast and sides reddish brown, rest of the under parts white. The female is smaller and duller coloured than the male. They migrate at irregular intervals in enormous flocks (of many millions at times) seeking for food, and are killed in large numbers, their flesh being dark coloured, but good eating. The passenger pigeon is found throughout temperate North America.

Passenger Pigeon (*Ectopistes migratorius*).

Pass'eres (Lat. *passer*, 'sparrow'), the name given by Cuvier to the order of birds otherwise called Insessores, comprising more than half of all the birds. As the order has no well-marked characters, sparrow-like or other, common to all its members, neither name is prominent in newer classifications. See BIRD, Vol. II. p. 173.

Passionflower (*Passiflora*), a genus of plants almost exclusively natives of the warm parts of America, and belonging to the natural order Passifloraceæ. The flowers are hermaphrodite, with a coloured calyx, generally of five segments; the corolla also of five segments or wanting; always having a more or less conspicuous crown of filaments springing from the throat of the tube formed by the base of the calyx and corolla. The stamens are five, inserted in the tube of the calyx, united in a tube to near the apex, where they divide, and are surmounted by the much-reflexed anthers. The ovary is one-celled, elevated on a stalk, surmounted by three thick styles with thick clove-like stigmas. The fruit is fleshy. This genus has received its name from fanciful persons among the first Spanish settlers in America imagining that they saw in its flowers the emblems of our Lord's passion; the filamentous processes being taken to represent the crown of thorns, the nail-shaped styles the nails of the cross, and the five anthers the marks of the wounds. The species are mostly half-shrubby evergreen or stove climbers, of rapid growth; and most of them have lobed leaves, with from two to seven lobes. The flowers of many are large and beautiful, on which account they are often cultivated in hothouses. Some of the species are also cultivated in tropical countries for their fruit, particularly those of which the fruit is known by the name Granadilla (q.v.). The apple-fruited Granadilla or Sweet Calabash of the West Indies is the fruit of *P. maliformis*, which is about two inches in diameter, containing within a hard stringy shell an agreeable gelatinous pale yellow pulp. *P. quadrangularis* is the common Granadilla, a native of Jamaica and South America, but is cultivated in all parts of tropical South America, and occasionally in hot-houses in Britain for the sake of its fruit. The fruit is oblong in shape, often six inches in diameter transversely. The skin when ripe is greenish yellow in colour, thin, but tough and leathery, and contains a very succulent pulp of a purple colour which is sweet and slightly acid. It is generally eaten with wine and sugar. The root of the plant is poisonous, owing to the presence of an active principle called *passiflorine*, the properties of which are similar to morphine. The laurel-leaved Granadilla is *P. laurifolia*, the fruit of which is named *Water-lemon* by the English and *Pomme de Liane* by the French in the West India Islands. It grows to about the size of a hen's egg, becomes yellow, dotted over with white when ripe, and contains within the tough thin rind a whitish sweet watery pulp, delicately aromatic and slightly acid. It quenches thirst, allays heat, and induces appetite. *P. incarnata*, a species with herbaceous stems, a native of the warm parts of South America, produces an edible orange-coloured fruit about the size of an ordinary apple. The fruit of *P. edulis* is about two inches long and slightly less in diameter, assuming a livid purple colour when ripe, and contains an orange-coloured pulp with the flavour of a somewhat acid orange. The fruit of some species of passionflower, however, is not only uneatable, but fetid; and the roots, leaves, and flowers of some have medicinal properties, narcotic, emmenagogue, anthelmintic, febrifugal, &c. The hardiest species, the Blue Passionflower (*P. cærulea*), grows well enough in some parts of France, and even in the south of England.

Passionflower (*Passiflora cærulea*).

Passionists, a religious congregation of priests of the Roman Catholic Church, the object of whose institute, indicated by their name, is to preach 'Jesus Christ and him crucified.' The founder, St Paul of the Cross, was born in 1694 near Genoa, obtained the sanction of Benedict XIV. in 1741, and died at the mother-house of the society on the Cœlian Hill at Rome in 1775. The cross appears everywhere as their emblem, and a large crucifix forms part of their very striking costume. They practise many personal austerities, and their ministerial work consists chiefly in holding what are called 'missions' wherever they are invited by the local clergy, in which sermons on the passion of Christ, on sin, and on repentance, together with the hearing of confessions, hold the principal places. For a time the congregation remained in obscurity; but in the first half of the 19th century

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it rose into notice. In 1842 it secured a footing in England, whose conversion had been the founder's special aim, and in which there are now five houses; there are two in Ireland and one in Scotland. The American province, begun in 1852, numbers between one and two hundred religious houses. There are many Passionist fathers in Bulgaria and Roumania, in Belgium and New South Wales.

Passion Music. See ORATORIO.

Passion Play. See MYSTERIES.

Passion-Week, the name commonly given in England to the week immediately preceding Easter, and otherwise called Holy Week (q.v.). But, by the proper rubrical usage, Passion-Week is that which precedes Holy Week, commencing on Passion Sunday, the fifth Sunday of Lent. In the Roman Catholic Church, with this Sunday begins the more solemn part of Lent, and during the succeeding fortnight the *Gloria Patri* is omitted at the Introit, and all pictures, crucifixes, statues, and other sacred representations are veiled.

Passive Obedience. See DIVINE RIGHT, BODIN, FILMER.

Passover, a well-known feast of the Jews. The English word *passover* is a translation of the Hebrew *pesach*, which in Aramaic with the post-positive article becomes *pascha;* whence the Greek, Latin, and various Romance forms of the word. The original meaning of the verb may perhaps be traced in 1 Kings, xviii. 26, where it is rendered 'leap' or (revised version margin) 'limp,' and suggests a religious dance. The root occurs in Tiphsah (1 Kings, iv. 24) or Thapsacus, an important ford or ferry over the Euphrates. The Passover is one of the oldest recurrent sacrifices of the Hebrews; an account of its origin is given in Exod. xii.; famous celebrations of it are described in 2 Chron. xxx., xxxv., and Ezra vi.; and the laws and regulations relating to it will be found in Exod. xii. 1–51, xiii. 3–10, xxiii. 14–19, xxxiv. 18–26, Lev. xxiii. 4–14, Numb. ix. 1–14, xxviii. 16–25, Deut. xvi. 1–8. These laws were formerly held to be all practically contemporary pieces of legislation; but they are now known to be of very various dates and to relate to widely-different religious and social conditions (see PENTATEUCH). In all of them the Passover is intimately associated with the Feast of Unleavened Bread; but the latter is essentially an agricultural festival, and the earliest origin of the Passover must doubtless be sought in the times when the Israelites were still a purely nomadic and pastoral people, and gave religious expression to their thankfulness for the annual increase of their flocks and herds by sacrifices 'of the firstlings of the flock and the fatlings thereof' (Gen. iv. 4). The recollection of such an annual festival, which would naturally be held in spring, survives in the Jehovistic narrative of the events preceding the exodus, which largely turned on the refusal of Pharaoh to allow the people to go out into the wilderness to sacrifice. It was, we infer, a nocturnal lunar feast, held at the spring full moon, and this character it retained throughout; it consisted of the firstlings of the flock and of the herd, and even as late as the close of the 7th century B.C. the victim was not necessarily a lamb (Deut. xvi. 2; cf. 2 Chron. xxxv. 7: 'lambs, kids, bullocks'). With the settlement of the Israelites as an agricultural people in Canaan, the agricultural festivals, marking the various stages of harvest and ingathering, naturally gained in prominence, and the pastoral Passover came to be more and more closely associated with a harvest feast which also fell in spring—that of unleavened bread—when after the presentation of the first sheaf before Jehovah the people entered at once upon the enjoyment of the new corn, without waiting for the tedious process of leavening their dough. The usages of the various local and domestic sanctuaries in the land were made uniform (Deut. xvi. 1–16) by the promulgation of the law of one exclusive place of worship. Of subsequent modifications made on the Deuteronomic code by the Priestly legislation the most interesting perhaps are the stricter definition of the kind of victim, the substitution of roasting for 'boiling' (see Deut. xvi. 7, revised version margin), and the interpolation of an additional day into the accompanying feast (Deut. xvi. including the Passover in the seven days of unleavened bread, while Numbers xxviii. counts the seven days from the 15th, not the 14th, of the month).

The celebration of the Passover in later times had public and official aspects which were invested occasionally at least with great pomp and ceremony, as may be gathered from the descriptions already referred to in Chronicles and Ezra; but, just like great ecclesiastical functions in our own day, it also had its private and domestic side. From Talmudic sources we gather a good deal that is of interest as to Passover customs in connection with the life of Jesus and the last supper. The company for a single lamb varied from ten to twenty; first the cup of consecration, over which the master of the house had pronounced a blessing, was drunk; then hands were washed and the meal served, consisting of bitter herbs, cakes of unleavened bread, a sauce called *haroseth*, made from dates, raisins, and vinegar, the paschal lamb, and the flesh of subsidiary (Deuteronomic) sacrifices. The master of the house dipped a morsel of unleavened bread into the haroseth, and ate it, and a similar 'sop' was given to every one present. Afterwards the paschal lamb was eaten, and three other cups of wine were drunk at intervals with thanksgivings and singing of the Hallel (Psalms cxiii.–cxviii.). To the Jews of the Dispersion the Passover, together with the Feast of Unleavened Bread, has always had great importance, though the lamb, not being slain at the Temple, is not regarded as strictly the paschal lamb of the law.

That the paschal lamb typified Christ is taught by Paul (1 Cor. v. 7), and also by the author of the fourth gospel (John, xix. 36), who, as is well known, represents the crucifixion as having taken place at the time of the Passover, and attaches importance to the fact.

For the history of the Passover in its bearings on Old Testament criticism, see Wellhausen's *History of Israel* (1885), Dr W. H. Green's *Hebrew Feasts* (New York, 1885), and other works cited under PENTATEUCH and BIBLE. For later Jewish practice, see Bartolocci's *Bibliotheca Rabbinica* or Bodenschatz's *Kirchliche Verfassung der Juden.*

Passow, FRANZ, scholar, born at Ludwigslust in Mecklenburg, 20th September 1786, was educated at Gotha and Leipzig, and in 1815 become professor of Archæology at Breslau, in 1829 director also of the museum of art there. He died 11th March 1833. His *Handwörterbuch der griechischen Sprache* (1819–24; 5th ed. 1841–57) is the work that preserves his memory, and formed the basis of Liddell and Scott's *Greek Lexicon.* See his Life by Wachler (Bresl. 1839).

Passport, a warrant of protection and permission to travel, granted by the proper authority, to persons moving from place to place. Passports are sometimes issued by the ministers and consuls of the country which the traveller intends to visit, which cannot, however, be done without the consent or connivance of the state of which the holder of the instrument is a subject; they properly proceed from the authorities of the state to which the traveller belongs, and ought to bear the *visa* or countersignature of the minister or consul of the country which he is about to visit. In some

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European states no one is allowed to go abroad without a passport from his government authorising him to leave the country—a provision used as a means of detaining persons charged with crime; and passports are even required by the natives to enable them to go from place to place in their own country. The regulations of different states have varied much regarding the use of passports; and of late years there has been a great relaxation of the stringency of the regulations connected with them. Sweden was the first country to give up demanding passports in time of peace; Russia and Turkey still insist on them; sometimes, as during anti-socialist excitements, German authorities demand passports from foreigners not travelling, but wishing to reside for a period of weeks in any given place; Portugal asks them of persons leaving the country by sea; and on the French and German frontiers the neighbour-governments are specially inquisitorial. Within the United Kingdom no passports are required; but for a British subject travelling in some parts of the Continent they are still requisite. Even where not necessary, they are often useful in order to prove identity—in asking for letters at a foreign post-office, for example. At some of the German universities the production of passports and other 'papers' is required of all foreign students matriculating. The passport most used by British subjects is that of the British Secretary of State for Foreign Affairs, which is now granted to any British subject for a fee of two shillings, and is good for life. If the applicant be not personally known to the Secretary of State, he must either be recommended to him by some person who is known to him, or produce an application in his favour by some banking firm established in London or elsewhere in the United Kingdom, or a certificate of identity signed by a mayor, magistrate, justice of the peace, minister of religion, physician, surgeon, solicitor, or notary resident in the United Kingdom. In certain cases the production of a certificate of birth may be required. If the applicant be a naturalised British subject his certificate of naturalisation must be forwarded to the Foreign Office.

In time of war passports or safe-conducts may be granted in special cases by neutral powers, to protect persons and property from belligerents, and by a belligerent to protect from interference by its own ships or forces.

Passy, a western suburb of Paris (q.v.).

Pasta, GIUDITTA (JUDITH), opera singer, was born of Jewish parents, Negri by name, at Como near Milan, 9th April 1798, and received her musical education at Como and in the conservatoire at Milan. She married a singer called Pasta before 1816, and was at first a failure on the stage. Her first great triumph was achieved at Verona in 1822, seven years after she began to sing. The year following she was engaged at the Paris Italian Opera, where her singing excited great admiration. From 1825 to 1833 was the period of her most splendid triumphs, which were won principally in London and Paris. She withdrew from the stage in the following year, and resided on the banks of Lake Como till she died on 1st April 1865. She had a magnificent voice, which passed easily from the highest soprano notes to the gravest contralto tones. In addition she possessed fine dramatic power. Her principal rôles were Medea, Desdemona, Semiramide, La Sonnambula (the opera of this name was written for her by Bellini), Nina, Camilla, and Giulia in *Romeo e Giulia.*

Pasteboard. See CARDBOARD, MILLBOARD, STRAWBOARD.

Pastel, chalk mixed with other materials and various colours, and formed into Pencils or Crayons (q.v.). Drawings with such dry, coloured crayons may be made on paper or parchment, and have been especially used in portraiture.—Pastel is also a name for Woad (q.v.).

Pastes. See GEM.

Pasteur, LOUIS, distinguished for his researches in chemistry and pathology, and more precisely for many discoveries in regard to bacteria, was born on 27th December 1822, at Dôle in the department of Jura. From the college of Arbois he passed to Besançon, and thence to the École Normale and the Sorbonne in Paris. After the completion of his preparatory studies he held various academic positions at Strasburg, Lille, and Paris, where in 1867 he became professor of Chemistry at the Sorbonne. Since 1886 the centre of his work has been at the Pasteur Institute in Paris. His work was at first chemical. Following up well-known researches by Arago, Biot, and Mitscherlich, Pasteur discovered the facets on tartrate crystals and what are called left-handed tartrates. He also propounded the theory that 'molecular dissymmetry'—supposed to be expressed in the power which solutions of some organic substances have of causing a beam of polarised light to rotate—was characteristic of living matter and its products.

It is said that a German manufacturer of chemicals noticed that impure tartrate of lime fermented when dissolved and exposed in the sun, and that this prompted Pasteur to an investigation, the result of which was the discovery of a living ferment—a micro-organism comparable in its powers to the yeast-plant which Cagniard-Latour and Schwann had discovered in alcoholic fermentation. Pasteur was further able to show that the little organism would, in a solution of paratartrate of ammonia, select for food the 'right-handed' tartrates alone, leaving the 'left-handed,' although the difference between these is merely physical not chemical. Having got hold of a clue, Pasteur went on to show that other fermentations—lactic, butyric, acetic—are essentially due to organisms. He was naturally led to corroborate and extend Schwann's researches on putrefaction, which is also due to micro-organisms, and this path of investigation enabled him to make important practical suggestions in regard to the making of vinegar and the prevention of wine disease, as also to correct insufficiently careful experiments which were leading many to believe that spontaneous generation was demonstrable.

Prompted by his illustrious master Dumas, Pasteur next (1865) directed his inquiries to those diseases of silkworms by which the silk industry in France had been almost ruined. It is said that he had never before even seen a silkworm, though he knew the supposed disease-germs which had been demonstrated by previous investigations in the insect's blood. These he traced from egg to larva, from chrysalis to moth; and, as the pébrine disease is distinctly manifest in the adults, though it may be hidden in the young, the practical conclusion was plain that unhealthy moths should be rejected, and that all precautions should be taken to prevent infection. But Pasteur's work on the diseases of silkworms overstrained him, and in 1868 he was laid aside by paralysis. Soon, however, he was at work again, investigating beer as he had investigated wine, detecting the intruders which sometimes interfere with the life of the yeast-plant and spoil the brew. His researches began to come yet closer to human life, for he attacked the problem of splenic fever, the bacillus of which had been discovered by Davaine (1863), and skilfully traced from stage to stage by Koch (1876). Of Pasteur's investigations in this connection, that by which he showed that birds were not liable to fall

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victims to splenic fever, because the temperature of their blood is too high for the prosperity of the germ, may serve as a characteristic illustration. Passing from splenic fever to fowl cholera, Pasteur showed that it was possible to attenuate the virulence of injurious micro-organisms by exposure to air, by variety of culture, or by transmission through various animals. He thus 'tamed' the bacillus of splenic fever, and demonstrated by a memorable experiment that sheep and cows 'vaccinated' with the attenuated bacilli were protected from the evil results of a subsequent inoculation with the virulent virus. Pasteur's subsequent researches in regard to hydrophobia are discussed in the article on that subject. We have by no means mentioned all that Pasteur's rapid industry and experimental genius have achieved, but sufficient illustration has been given of the splendid series of discoveries by which he has enriched science and benefited humanity.

See the Life by his son-in-law, translated from the French by Lady Claud Hamilton, with an introduction by Professor Tyndall (1885).

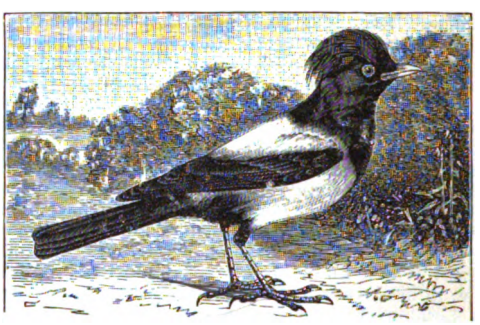
Pastille (diminutive of paste) originally applied to lozenges as little portions of confectionery paste, but it has been of late chiefly confined to a mixture of odorous materials, as in the case of the *fumigating pastilles*, which are burned either as incense or as a means of diffusing an agreeable odour. They are composed of charcoal powder, with such aromatic gums as benzoin, ladanum, &c., and powders of sweet-scented woods and barks, as sandalwood, cinnamon, and especially cascarilla barks. Essential oils are also added, and the whole are worked into a paste with a little gum-mucilage, and formed into small sharp-pointed cones about an inch and a half high, and half an inch broad at the base. When perfectly dry they are used by lighting at the point, and as they burn down an agreeable odour is given out with the smoke. Another kind of pastille, usually in the form of a small pill covered with gold or silver leaf, is used for perfuming the breath; it is made of similar ingredients, excepting the charcoal.

Pasto, a town in the south-west of Colombia, in a fertile valley 8350 feet above sea-level. Above it rises the volcano of Pasto (14,000 feet above the sea); and in 1827 the town was destroyed by an earthquake. It manufactures cloth. Pop. 10,000.

Paston Letters, a collection of over a thousand letters and papers, mostly written by or to particular members of the Norfolk family of Paston, and covering almost the whole 15th century (1422–1509). They are of especial value as giving a glimpse into the life of England during the Wars of the Roses. The family took its name from the village of Paston, near the sea, about 20 miles N. of Norwich, and gradually grew upwards out of the condition of the smaller gentry of Norfolk. Its most famous members were William Paston, Justice of Common Pleas under Henry VI.; his son John, executor to the famous Sir John Fastolf; Clement Paston, a brave sailor under Henry VIII.; Sir Robert Paston, created under Charles I. first Viscount, then Earl, of Yarmouth. His son William married Lady Charlotte Boyle, an illegitimate daughter of Charles II., but with him the main line and the title became extinct. It was due to the extravagance of the last that the letters were sold to Peter Le Neve, from whom they passed into the hands of 'honest' Tom Martin of Palgrave, and eventually of Sir John Fenn, who edited a selection in two quartos in 1787. The editor presented the originals of these to the king, and was knighted, but these originals have since strangely disappeared. Volumes iii. and iv. followed in 1789; vol. v. posthumously, edited by Mr Serjeant Frere, in 1823. The originals of vol. v. were discovered at Mr Serjeant Frere's house at Dungate, Cambridgeshire, in 1865; those of iii. and iv. were long missing, but the whole 220 were discovered in 1875 at the family mansion of the Freres at Roydon Hall near Diss, together with ninety-five unpublished letters of the same period, described in Mr Gairdner's third appendix. These 311 letters were offered for sale in a London auction-room in 1888, but failed to find a purchaser at 500 guineas.

There is an admirable edition of the Paston Letters by James Gairdner in Arber's 'Annotated Reprints' (3 vols. 1872–4–5). It contains double as many letters as Sir John Fenn's, and, moreover, the letters are here for the first time arranged in chronological order. Mr Gairdner's answer (*Fort. Review*, No. 11) to Herman Merivale's attack on the authenticity of the Paston Letters (*Fort. Review*, No. 8) was completely satisfactory.

Pastor (*Pastor roseus*), a beautiful bird allied to the starlings. It is a native of the plains of Western Asia, winters in India, and strays even to north-west Europe. The greenish-black plumage



Pastor (*Pastor roseus*).

is relieved by pink about the shoulders and some other parts. The bird is a welcome enemy of locusts, and the name probably refers to its habit of following flocks of sheep.

Pastoral Epistles. See BIBLE, Vol. II. p. 124; and the articles TIMOTHY, TITUS.

Pastorales. See BASQUES.

Pastoral Letter, a letter addressed, either at certain stated times or on the occurrence of some notable occasion, by a 'pastor,' but especially by a bishop, to the clergy under his jurisdiction, to the laity of his flock, or to both.

Pastoral Poetry professes to delineate the scenes and incidents of shepherd life. As an attempt to realise an imaginary and highly idealised state of society it is a completely artificial form, and it has already disappeared from literature, never to be revived. The delightful Dorsetshire poems of Barnes exhibit the only natural method in which pastoral society can give subjects to modern poetic art. The pastorals of our modern literatures are essentially a humanistic revival of the Greek *idyl* of Theocritus, Bion, and Moschus, and the Latin *eclogue* of Virgil, and first made their appearance in Tuscany in the 16th century. The earliest dramatic pastoral is the *Favola di Orfeo* of Politian, performed at the court of Mantua in 1472, but the first complete pastoral was Agostino Beccari's comedy, *Il Sacrifizio*, played at Ferrara in 1554. Its finest and most famous successors were the *Aminta* of Tasso, represented at the court of Ferrara in 1573, and Guarini's *Pastor Fido*. The earliest non-dramatic pastoral was G. Sannazaro's *Arcadia* (1504), which through Sidney's famous romance with the same title exercised a great influence upon English literature. In Spain the pastoral flourished during the

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16th century, some of the most notable names being Gil Vicente, Jorge de Montemayor (*Diana*, 1524), and Cervantes (*Galatea*, a pastoral romance, 1584). In France we already find Rémy Belleau's miscellany, *La Bergerie* (1565), and the writing of pastorals was practised long after even by the great Richelieu. After Honoré d'Urfé's *Astrée* (1610), came a long succession of lengthy pastoral romances by Mdlle. de Scudéry, La Calprenède, and Gomberville. In England we had already had Alexander Barclay's translations of Baptist Mantuan, and Barnaby Googe's *Eglogs, Epytaphes, and Sonnettes* (1563), before the twelve charming eclogues composing Spenser's *Shepherd's Calendar* (1579) formed once for all a faultless model for posterity. The poem is appropriately dedicated to Sir Philip Sidney, whose pastoral romance of *Arcadia* outstrips in point of literary beauty all other fictions of that class. Its successors were Robert Greene's *Morando* (1584) and *Menaphon* (1589), Lyly's *Gallathea* (1584), Peele's *Arraignment of Paris* (1584), and, most famous of all, Lodge's *Rosalynde* (1590). Spenser's poetical idealisation of pastoral life, again, gave rich inspiration to Drayton, Daniel, Barnfield, Marlowe, Nicholas Breton, Wither, William Browne, Herrick, Ben Jonson (*Sad Shepherd*), and Fletcher (*Faithful Shepherdess*, 1610, the finest of all pastoral plays). An 18th-century revival gave us the pastorals of Ambrose Philips and of Pope, and awakened a pretty quarrel between the two ill-matched champions; Gay's *Shepherd's Week* was much better poetry than either, and was brightened by honest humour and glimpses of genuine country life. An imitator, Allan Ramsay, also achieved a success in his *Gentle Shepherd*, which is almost as good as Gay, though far behind Spenser.

Pastoral Staff, often also, although not properly, called Crosier (q.v.), one of the insignia of the episcopal office, sometimes also borne by an abbot. It is a tall staff of metal, or of wood ornamented with metal, having, at least in the Western Church, the head curved in the form of a shepherd's crook, as a symbol of the pastoral office. From an early time the pastoral staff was connected with the actual possession of the jurisdiction which it symbolises. The giving of it was one of the ceremonies of investiture; its withdrawal was part of the form of deprivation; its voluntary abandonment accompanied the act of resignation; its being broken was the most solemn form of degradation. We annex as a specimen of the highest art the pastoral staff of William of Wykeham, now preserved in his foundation, New College, Oxford. A very early form of the pastoral staff is represented at FILLAN (ST).

Pastoral Staff.

Pastoral Theology, that branch of theological science which regards the duties and obligations of pastors in relation to the care of souls.

Pasture. A pasture may be defined as a crop of mixed grasses and clovers, or other leguminous plants, intended for purposes of grazing. Such a crop usually occupies the land for many years, and is then called permanent pasture. The chief benefit accruing to the farmer is that the mixed plants occupy the land more completely than the same constituents grown in separate plots. The various species of the mixture overlap and foster one another; thus produce is increased, and quality of herbage improved. From this point of view, a pasture is an agricultural device for increasing the amount of land at disposal, since from a single acre of mixed crop as much produce may be obtained as from, say, 1¼ acre laid down under pure sowings.

The chief plants used in Britain for forming pasture may be classified thus:

(A) *Top Grasses.*—Cock's-foot (*Dactylis glomerata*), Meadow Fescue (*Festuca pratensis*), Meadow Fox-tail (*Alopecurus pratensis*), Timothy (*Phleum pratense*), Italian Ryegrass (*Lolium italicum*).

(B) *Bottom Grasses.*—Crested Dog's-tail (*Cynosurus cristatus*), Fiorin (*Agrostis stolonifera*), Hard Fescue (*Festuca duriuscula*), Rough-stalked Meadow Grass (*Poa trivialis*), Smooth-stalked Meadow Grass (*Poa pratensis*), Wood Meadow Grass (*Poa nemoralis*), Sweet Vernal (*Anthoxanthum odoratum*), Yellow Oat-grass (*Avena flavescens*), Perennial Ryegrass (*Lolium perenne*).

(C) *Clovers and Leguminous Plants.*—Alsike Clover (*Trifolium hybridum*), Red Clover (*Trifolium pratense*), White Clover (*Trifolium repens*), Trefoil (*Medicago lupulina*), Bird's-foot Trefoil (*Lotus corniculatus*).

This list includes several species which are not permanent, but of short duration, as Timothy, Italian and perennial, ryegrass, red and Alsike clover, and trefoil. Timothy lasts from four to six years, and at times even longer. Perennial ryegrass has a very misleading name, inasmuch as it may die out in three or four years; in other cases, where seeding is prevented, the ryegrass may become, to all intents and purposes, a perennial plant. The reasons for including short-lived constituents in permanent pasture are obvious. They not only give increased produce during the first years of the lea, when the permanent species are slow in coming forward, but hold possession of land which would otherwise be bare, and thus keep out worthless plants. Place is made for the expanding perennials by the short-lived species which gradually die out. This must be carefully borne in mind when fixing the proportion of short-lived plants in a mixture.

The following are the leading principles according to which the various constituents of a mixture are proportioned: (1) To obtain maximum produce, the land must be filled with roots as thoroughly and completely as possible. This is accomplished by incorporating deep-rooted and shallow-rooted plants in due proportions. If, for example, a soil is 3 feet deep, and the roots occupy merely 1 foot of this depth, two-thirds of the land is, evidently, lying idle and unutilised, not for one year, as when under an ordinary crop, but for a long series of years in the case of a permanent pasture.

(2) The nutritive value of the mixed herbage depends upon the relative proportion of grass and clover: the albuminoid ratio increases with the amount of clover. For a permanent pasture good proportions are clovers, 20 to 30 per cent. of total area; grasses, 70 to 80 per cent.

(3) As many species as possible should be represented in the mixture. If one is injuriously affected by drought, another, which revels in drought, is ready to take its place; if one is late, another is early; if one is not relished by the browsing animal, another is, and so on.

(4) Those species which are best and most suitable for the soil should be most largely represented.

(5) Certain species liable to overrun the pasture, or to destroy other good plants, ought to be represented in extremely small proportions. This applies more particularly to ryegrasses (especially

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Italian), crested dog's-tail, and smooth-stalked meadow grass.

(6) The short-lived components should not cover more than one-third of the whole land.

According to these principles, a mixture suitable for a wet clay might be proportioned as follows:

Area of the land to be covered by clovers, 20 per cent:

Red clover.....5 per cent.	White clover.....5 per cent.
Alsike clover.....5 "	Bird's-foot trefoil...5 "

Area to be covered by short-lived grasses, 20 per cent:

Timothy.....15 per cent.	Perennial ryegrass....5 per cent.

Area to be covered by permanent grasses, 60 per cent:

Cock's-foot .....20 per cent.	Rough-stalked meadow grass .....10 per cent.
Meadow fescue....15 "	Smooth-stalked do. 5 "
Meadow fox-tail....10 "	

The percentage area of land to be occupied by each component being determined and known, the percentage numbers have to be translated into pounds of seed per acre. To get the number of pounds corresponding to these areas the covering power of each kind of seed used must be known. We assume, as a basis for calculation, that the seed is perfect in quality—i.e. the percentage of purity is 100, and the percentage of germination also 100. According to Stibler, one acre of land is covered by the following amounts of perfectly pure and germinating seeds:

	Lbs. of Seed per acre.		Lbs. of Seed per acre.
Cock's-foot	28	Hard fescue	19
Meadow fescue	56	Sweet vernal	12
Meadow fox-tail	10	Yellow oat-grass	7
Timothy	21	Perennial ryegrass	58
Italian ryegrass	49	Alsike clover	14
Crested dog's-tail	20	Red "	24
Florin	11	White "	12
Rough-stalked meadow grass	13	Trefoil	22
Smooth-stalked "	13	Bird's-foot trefoil	7

In using these numbers as a basis for calculating mixtures, allowance must be made for seeds which cannot germinate on account of imperfect tillage, and also for the overlapping of the plants when grown in mixture. An allowance of 50 per cent. is found, in ordinary cases, to meet these requirements. The amount of seed per acre actually used in mixtures is, accordingly, the amount calculated for an acre and a half.

The mixture already given for a wet clay soil when translated into pounds of perfect seed per acre (making an allowance of 50 per cent.) is:

Red clover	1·8	Cock's-foot	8·4
Alsike clover	1·0	Meadow fescue	12·6
White "	·9	Meadow fox-tail	1·5
Bird's-foot trefoil	·5	Rough-stalked meadow grass	1·9
Timothy	4·6	Smooth-stalked ditto	·9
Perennial ryegrass	4·3		

By simple proportion pounds of perfect seed can be immediately converted into pounds of commercial seed of any given quality.

Patagonia, the most southern region of the South American continent, extending from S. lat. 39° southwards to the Strait of Magellan, which, for a distance of 375 miles, separates it from the desolate archipelago of Tierra del Fuego. Length, upwards of 1000 miles; greatest breadth, about 480 miles; area, about 322,550 sq. m.; population, doubtfully estimated at about 20,000. Like the rest of the continent, Patagonia is divided by the Andes into two very unequal and dissimilar territories. Since 1881 nearly the whole country east of the watershed has been formally recognised as part of the Argentine Republic; while Chili, which previously claimed a considerable share of that area, has contented herself with the country to the west and a strip along the southern coast. Thus the political in the main agrees with the physical partition.

Western or Chilian Patagonia (63,000 sq. m.), comprising the territory of Magellan, is rugged and mountainous. Along the coast, and stretching from 42° S. to the Strait of Magellan, are numerous islands, with precipitous shores, belonging apparently to the system of the Cordilleras; the principal being the Chonos Archipelago (q.v.), Wellington Island, the Archipelago of Madre de Dios, Queen Adelaide's Archipelago, and Desolation Island. These islands, together with several peninsulas, notably Taytao, form a coast almost as rugged as that of Norway; but in none of them do the mountains rise to the snow-line. Even in the Cordilleras proper the summits are less lofty towards the south; but the following are worthy of note—the volcanoes of Minchinmavida and Corcovado (respectively 8000 and 7510 feet high), Monte San Valentin (12,697), Chalten or Fitzroy volcano (7120), and Mount Stokes. From the Andes to the Pacific the strip of shore is so narrow that the longest river of this district has its origin only about 13 miles from the coast. In the Island of Chiloe (q.v.), to the north of Western Patagonia, the mean temperature of winter is about 40°, that of summer rather above 50°; while at Port Famine, 800 miles nearer antarctic latitudes, the mean temperature is in winter about 33°, and in summer about 50°. This unusually small difference in the mean temperature of the extremes of Western Patagonia is due to the great dampness of the atmosphere all along the coast. The prevailing winds blow from the west; heavily charged with moisture from the Pacific Ocean, they strike against the Andes, and cause almost perpetual precipitation from Chiloe to the Strait of Magellan. South of 47° S. lat. hardly a day passes without rain, snow, or sleet. This continual dampness has produced forests of almost tropical luxuriance, which yield valuable timber. Coal is mined in the neighbourhood of Punta Arenas (Sandy Point); and here the Chilian government has, since 1851, a colony and penal settlement (pop. in 1882, 1291).

Eastern or Argentine Patagonia consists mainly of high undulating plains or plateaus rising in successive terraces, and frequently intersected by valleys and ravines. These plateaus are occasionally covered with coarse grass, but more frequently with a sparse vegetation of stunted bushes and herbs; elsewhere the surface is strewn with huge boulders, and again rugged with heaps or ridges of bare, sharp-edged rocks. Keen and often piercing blasts sweep chiefly from the west; and as this wind has already parted with its moisture on the other side of the mountains, hardly any rain falls in Argentine Patagonia during seven or eight months of the year. The soil in many places is strongly impregnated with saltpetre, and salt-lakes and lagoons are numerous. North of the Rio Chico, and towards the seacoast, there is a wild, weird, desolate region called by the Indians 'The Devil's Country.' Several wastes of this kind fringe the Atlantic, and formerly induced the belief that Patagonia was a barren and waterless desert; but the interior, though not fertile, really abounds in lagoons, springs, and streams, and the banks of the rivers are capable of cultivation. Along the eastern base of the Andes, also, there is a great tract of territory which is astonishingly picturesque and fertile, with great forests to which the Indians retire for shelter from the freezing winds of winter. The principal rivers of Argentine Patagonia are the Rio Negro (q.v.), which forms its northern boundary, the Chubut (q.v.), Deseado, Chico, Santa Cruz, and Gallegos. All these rivers rise in the Andes. To the west of San Martin and Moreno appears the smoking summit of Chalten; and the whole scenery of the district, with rugged mountains rising sheer from the water, with glaciers, snows, and floating icebergs, is unspeakably grand and terrible. The

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whole of Eastern Patagonia has probably been raised above the sea-level in the Tertiary period, and its most characteristic geological feature is its boundless expanses of shingle. The flora is in consequence exceptionally poor, and appears to be mainly derived from the lower slopes of the Andes. Herds of horses and, in the more favoured regions, cattle are bred; pumas and foxes, armadillos, skunks, and tucotucos (a peculiar rodent) are met with; and among the birds are condors, hawks, partridges, and flamingoes, ducks, and other waterfowl. But by far the most important animals are the guanaco or Huanaca (q.v.), sometimes in herds of two hundred or more, and two species of Rhea (q.v.).

Inhabitants.—The population of Western Patagonia, estimated at 3200 (or, including Tierra del Fuego, 4000), consists of a number of small indigenous nomadic tribes of Araucanian stock who live by fishing and hunting, and the settlers at Punta Arenas or Magellan's colony, mainly immigrants from Chiloe and other parts of Chili. In Eastern Patagonia the Argentine herdsmen are beginning to pasture their cattle in the northern valleys, and Chilian immigrants are moving eastwards. The Patagonians proper or Tehuelche Indians, who are confined to Eastern Patagonia, are perhaps about 7000 strong. They are generally divided into two great tribes, the northern and the southern, which speak the same language, but are distinguishable by difference of accent. The northern range chiefly over the district between the Cordilleras and the Atlantic, from the Rio Negro to the Chubut, and even the Santa Cruz River. The southern, who appear to be on an average taller and finer, and are more expert hunters, occupy the rest of Patagonia as far south as the Strait of Magellan. The two divisions are much intermixed. Magellan described the Patagonians as 'so tall that the tallest of us came up only to their waists;' and, though such extravagant statements have led others to deny the claim of the Patagonians to be considered exceptional, there is no doubt that they are one of the tallest races on the globe. The average height of the male members of Musters' party was rather over 5 feet 10 inches; two others, measured at Santa Cruz, stood 6 feet 4 inches each; Pikchoche, who was in Berlin in 1879, was 5 feet 9 inches high, and stretched 5 feet 11 inches with his arms. The muscular development of the arms and chest is extraordinary, and in general the body is well proportioned. The Patagonians are splendid swimmers, can walk great distances and for two and even three days on end without being tired. Their cranial characteristics are somewhat disguised by the fact that the hinder part of the skull is artificially flattened, the custom being to strap the child's head back to a board to prevent it 'waggling' when carried about the country on horseback. This process, however, appears only to exaggerate a natural tendency; and it is asserted by the most scientific investigators that the Patagonian skull is, next to that of the Lapps, the shortest in the world. The jaws are powerful, though with no trace of prognathism. The expression of their face is ordinarily good-humoured though serious; their eyes are dark brown, bright and intelligent, their noses aquiline and well-formed, their foreheads open and prominent. The complexion of the men, when cleansed from paint, is a reddish or rather yellowish brown. Thick flowing masses of long coarse, black, glossy hair cover their heads. The scanty natural growth of beard, moustaches, and even eyebrows, is carefully eradicated. The young women are frequently good-looking, displaying healthy, ruddy cheeks when not disguised with paint. The dress of the men consists of an under-garment round the loins, a long mantle of hide with the fur inside, and boots or buskins of skin. The dress of the women is very similar. Both sexes are fond of ornaments. Besides mantles of guanaco hide, their only manufactures are saddles, bridles, stirrups, and lassos, which often evince wonderful ingenuity and nicety of execution.

The Patagonians believe in a great and good spirit who created the Indians and animals. Idols are unknown, and whatever religious acts the natives perform are prompted by dread of demons. Kindly, good-tempered, impulsive children of nature, the Tehuelche take great likes or dislikes, becoming firm friends or equally confirmed enemies. Protestant missions have been established amongst them. They are steadily decreasing through disease and bad liquor supplied by traders, and before long will be extinct. The language is quite different from either Pampa or Araucanian. Of European settlements there are few in Argentine Patagonia. The oldest, Patagones (formerly El Carmen), on the Rio Negro, about 18 miles from its mouth, has a population of about 2000, composed of Spanish and other settlers (negroes), and convicts from Buenos Ayres. There are also the Welsh colony on the Chubut (q.v.), and a petty station at the mouth of the Santa Cruz.

History.—Magellan, before passing through the strait, had in 1520 sailed along the whole of the Patagonian coast; and it is commonly believed that it was from the large footsteps (*patagones*) observed near his winter-quarters at S. Julian that the country derived its name. Another suggested etymology is the Quichua word *patacuna*, 'terraces,' the rule of the Incas having extended hither. The great plain was traversed by Rodrigo de Isla in 1535. Sarmiento de Gambo (commemorated by the mountain in Tierra del Fuego) added greatly to the knowledge of the west and south (1579–80), and founded Spanish settlements, doomed to early extinction, at Nombre de Dios and San Felipe (Port Famine). English interest in the country, aroused by Drake's voyage in 1577, was kept up by Davis, Narborough, Byron, Wallis, and the Jesuit Falkner, and at last the beginning of a real scientific acquaintance with the interior was made by King, Fitzroy, Darwin, and Musters. Since 1870 careful explorations have been carried out by Argentine travellers.

English works on Patagonia are Falkner's (1774), Snow's (1857), Musters' (1871), Beerbohm's (1878), Lady Florence Dixie's (1880), Coan's (1880), Lucy Fossarieu's (French, 1884).

Patan, a walled town of India, in the territory of the Guicowar of Gujarat, 64 miles NW. from Ahmadabad, stands on a tributary of the Banas. It manufactures swords, spears, pottery, and silk and cotton goods. Standing on the site of the ancient Anhilwara, and the capital of native dynasties from the 8th century to the present day, Patan is surrounded with lofty walls, and has numerous architectural ruins. Pop. (1881) 32,712.

Patanjali is the name of two celebrated authors of ancient India, who are sometimes looked upon as the same personage, but apparently for no other reason than that they bear the same name. The one is the author of the system of philosophy called Yoga (see SANSKRIT LITERATURE), the other the critic of Pánini (q.v.), *circa* 140 B.C.

Patches. During the whole of the 17th and beginning of the 18th century these fantastic ornaments were commonly worn by women and sometimes by men. In *Jack Drum's Entertainement, or the Comedie of Pasquil and Katherine* (1601; 2d ed. 1616), they are thus mentioned: 'For even as blacke patches are worne, some for pride, some

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to stay the Rheume, and some to hide the scab,' &c.; and in the *Artificial Changeling* (1650) there is a woodcut showing the lady of fashion, with a coach, coachman, two horses, and postillions gummed on to her forehead, and the rest of her face ornamented with a star, two crescents, and a large round spot. In the same year (1650) a Bill against 'painting, black patches, and immodest dresses' was read for the first time, but got no further. In vain were sermons preached; in vain did *Morbus Satanicus, or The Sin of Pride*, in 1666 reach the 15th edition; in vain did satirists assail the *Metamorphosis of Fair Faces into Foul Visages* (*temp.* James I.); the senseless custom was still rife when (1712) Pope described among the treasures of Belinda's toilet-table 'Puffs, Powders, Patches, Bibles, Billet-doux' (*Rape of the Lock*, i. 138). Attempts have been made to revive the fashion, but without success. See Fairholt's *History of Dress and Costume in England* (2d ed. 1860).

Patchouli, a perfume derived from the dried branches of *Pogostemon patchouli* (natural order Labiatæ), first introduced into Britain as an article of merchandise in 1844. The name is from the Tamil *patchei*, 'gum,' and *elei*, 'leaf.' The plant, a low shrub 2½ or 3 feet high, is a native of Silhet, the Malay coast, Ceylon, Java, the neighbourhood of Bombay, and probably also of China; but, owing to the fondness of Asiatics for the perfume which it yields, it is difficult to say where it is native or cultivated. Every part of the plant is odoriferous, but the younger portions of the branches with the leaves are chosen; they are usually about a foot long. The odour is peculiar and difficult to define, but it has a slight resemblance to sandalwood; it is very powerful, and to many persons is extremely disagreeable. The odour of patchouli was known in Europe before the material itself was introduced, in consequence of its use in Cashmere to scent the shawls with a view of keeping out moths, which are averse to it; hence the genuine Cashmere shawls were known by their scent, until the French found the secret, and imported the herb for use in the same way. In India it is used as an ingredient in fancy tobaccos and as a perfume for the hair. It is also much prized for keeping insects from linen and woollen articles. The essence of patchouli is a peculiar heavy brown oil, with a disagreeably powerful odour; it is obtained by distillation, and requires extreme dilution for perfumery purposes. A cwt. of the plant yields about 28 oz. of the oil. The Arabs believe it to be efficacious in preventing contagion and prolonging life.

Patella. See KNEE, and LIMPET.

Paten (Lat. *patina*, 'a dish'), a small circular plate employed for the wafers or bread in the eucharistic service. It is always of the same material as the chalice, often richly chased or carved, and studded with precious stones.

Patent Medicines. In popular language this term is very loosely applied; being used to include not only patent medicines strictly so called, but also all proprietary medicines and all medicines liable to stamp-duty. The exact meaning of the technical phrase 'patent medicine' has never been defined by a legal judgment, but it is almost certain that it would only be held to include such medicines as are sold under the authority of letters-patent (i.e. for which a patent has been taken out), and that it does not include other dutiable medicines. The number of medicines for the making of which patents have been taken out in Britain is comparatively small, amounting only to about 220 articles between the years 1711 and 1887, and most of these are no longer in use. Patented medicines, therefore, constitute only a very small proportion of those medicinal preparations which are liable to stamp-duty. Medicines which are so liable embrace a very wide category. A preparation to be liable to stamp-duty must be one which is to be 'used or applied externally or internally as a medicine or medicament for the prevention, cure, or relief of a disorder or complaint incident to or in any wise affecting the human body.' Then it must also be brought under one of the following six causes, which constitute liability to duty: (1) the seller must have or claim to have an occult secret or art for making or preparing, or (2) an exclusive right or title to making or preparing; or (3) it must have been patented; or (4) it must be, or have been, recommended to the public as a nostrum (Lat. *noster*, 'our') or proprietary medicine, or (5) as a specific, or (6) as beneficial for the prevention, cure, or relief of any disease. *Any one* of these entails liability to stamp-duty independently of the others.

All other medicines are exempt from stamp-duty; that is to say, drugs the 'denominations, properties, qualities, virtues, and efficacies' of which are known and admitted in medicine, and in the making or preparing of which no secret art or exclusive right is claimed by any person. Instruments, electric and galvanic apparatus, liver-pads, and similar appliances, cigarettes, preparations intended to be burned and inhaled or used as disinfectants, natural products, mineral waters, lozenges and confectionery, articles of toilet and perfumery, are all as a rule exempt from stamp-duty unless under special circumstances. The first tax on proprietary and secret medicines in Great Britain was imposed in 1783, when all persons who sold medicines and who had not been bred as doctors or apothecaries were required to take out a license on which they paid stamp-duty, and in addition *ad valorem* stamp-duties were imposed on the medicines. It was estimated by the then Chancellor of the Exchequer that the new tax would yield £15,000 per annum. This act was amended two years later, and has been so altered by thirteen subsequent acts that none of its original provisions now remain. The patent-medicine stamp is a narrow label convenient for pasting on to a bottle or box. Such stamps are supplied by the commissioners of stamps, but for an extra payment any person may have the privilege of having stamps printed in the stamping department of Somerset House for his own exclusive use and on his own forms. The stamp affords no government guarantee of purity; its presence on any bottle or package simply signifies that the duty has been paid. The medicine must be stamped before it is sold either wholesale or retail, or for foreign or home consumption. Medicines are not considered liable to duty as long as they remain in bulk, nor are samples distributed gratis liable. The rates of duty vary from 1½d. on a package not exceeding 1s. in value to £1 on a package upwards of 50s. in value. The vendors of dutiable medicines are required to take out a yearly license, for which they pay 5s. Penalties are enforced for any infringement of the regulations. In 1860 the medicine-stamp duty yielded a revenue of £43,692; in 1870, £72,353; in 1880, £135,366; the year ending March 31, 1890, it was £217,264. See Alpe, *Handy Book of Medicine Stamp Duty*.

Patents. In the widest sense of the term, a patent is a royal grant made by letters-patent (*litteræ patentes*) or open letters, 'so called because they are not sealed up, but exposed to open view, with the Great Seal' (or a lawful substitute for the Great Seal) 'pendent at the bottom; and are usually addressed by the sovereign to all the subjects of the realm' (Blackstone). The principal grants made by letters-patent are titles of honour, such as

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peerages and baronetcies, appointments to judicial and administrative offices, charters of incorporation, and monopolies of the right to make, use, exercise, and vend new inventions. Of these grants it is here proposed to consider the last mentioned alone, to which the term patent is in common parlance restricted. It may, however, be observed in passing that the procedure connected with royal grants other than patents for inventions is still intricate and technical, resembling that which was in use for patents of invention before the Patent Law Amendment Act of 1852, and that such grants are enrolled on the Patent Rolls, and may be seen at the Record Office or, in the case of recent grants, at the Chancery Enrolment Office, London.

From a very early period in our history the sovereign has enjoyed and exercised the prerogative of securing to inventors, for a limited term, 'the sole right of making, using, and vending' new and useful inventions. Thus, it is stated that Edward III., on the representation of some alchemists, granted a commission to two friars and two aldermen to inquire whether a philosopher's stone might be made, and, on their reporting that the project was feasible, granted to the two aldermen a patent of privilege that they and their assignees should have the sole making of the philosopher's stone. Upon the royal prerogative, however, of which this case offers an early, though in all probability by no means the earliest, illustration, the common law placed certain definite and well-understood restrictions. (1) The sovereign could not grant the sole right to sell articles in common use. Thus, letters-patent granting to one John Pechey the sole importation of sweet wines into London were, at a parliament held in the fiftieth year of the reign of Edward III., declared to be void. (2) A grant of the sole right to exercise a known occupation was bad. This was decided as to the manufacture and importation of playing-cards in the leading case of Darcy *v.* Allin. (3) The grantee was required to have been at least the *introducer* of the invention within the realm. (4) The term of the grant must be for some limited period, such as might be sufficient for the instruction of others. (5) The subject-matter must be such as, in the result, led to a new trade or manufacture. (6) The patented invention must possess the incidents of utility and novelty, and must not be prejudicial or inconvenient to trade (1 Webster Patent Cases, 7. n.).

In the reign of Elizabeth, however, and still more emphatically in the reign of James I., the old common-law monopoly changed its character. The number of *bonâ-fide* inventions or discoveries was small. But the financial and political difficulties of the sovereign were great. The royal prerogative of granting limited monopolies 'for the good of the realm and the furtherance of trade' came, with many other doubtful expedients, to the sovereign's assistance. The common-law limitations were ignored. Currants, salt, iron, powder, cards, calf-skin, paper, tin, sulphur, and a hundred other commodities in common use were appropriated to monopolists for practically unlimited periods. The patentees were enabled to charge extortionate prices for inferior articles, to enter (at least under the saltpetre patents) private houses and ransack stables and cellars for infringing articles, and to have infringers brought before the council and punished for contempt of the royal authority. After a protracted struggle, in the course of which Queen Elizabeth recalled most of her obnoxious grants, and James published a counterblast against monopolies, which influenced his subsequent conduct very slightly, the famous Statute of Monopolies was passed in 1624. The purview of the measure has often been misrepresented. It did not, as we have seen, *create* the royal prerogative to grant letters-patent for inventions. But it declared that all such monopolies as the sovereign had latterly been granting were contrary to law and void. It then excepted from this sweeping prohibition (*inter alia*) 'grants of privilege for the term of fourteen years or under, thereafter to be made, of the sole working or making of any manner of new manufactures within the realm, to the true or first inventor or inventors, which others, at the time of making such letters-patent and grants, shall not use, so as also they be not contrary to the law, nor mischievous to the state, by raising prices of commodities at home, or to the hurt of trade, or generally inconvenient.'

This saving clause in the Statute of Monopolies is the foundation of the modern English patent system. It preserves, and at the same time limits, the royal prerogative to grant monopolies of inventions, and it gives a most succinct, and yet a complete, statement of the characteristics of a valid patent-grant. The *term* of the grant is to be fourteen years *or under;* and patents are in fact now always granted for a term of fourteen years. The *grantee* is to be 'the true and first inventor'—words which a series of judicial decisions has interpreted as including the first importer from abroad—of the patented invention. The *privilege* conferred is the sole and exclusive right to work or make the invention; and the *subject-matter* of a valid grant is 'any manner of new manufacture within the realm' which is (*a*) not in use at the date of the grant, (*b*) not contrary to law or mischievous to the state, (*c*) not to the hurt of trade, or (*d*) not generally inconvenient. The next important measure in the history of our patent law is Lord Brougham's Act, 1835. At common law, letters-patent were wholly void for any defect in part, not being a mere clerical error which the Master of the Rolls could correct; and a patentee was liable to be deprived of his patent from the failure of some condition, such as want of novelty in a very trifling part of the invention. The Act of 1835 enabled a patentee to enter with the clerk of patents, by permission of the crown, signified by the *fiat* of the law officer, a *disclaimer* of any part of the title or a memorandum of any alteration therein, which upon being filed by the clerk of patents, and enrolled with the description of the patent, was deemed and taken to be part of the letters-patent in all courts whatever. A still more important change was introduced by the Patent Law Amendment Act, 1852. The policy of granting patents is not only to reward inventors, but to induce them to disclose their inventions to the public. Different means of attaining the latter object have been adopted at different stages in the history of our patent law. The earliest practice was to insert in the grant a proviso requiring the inventor and his assignee to take apprentices during the last seven years of the term, and to teach them 'the knowledge and mystery' of his invention. In the reign of Queen Anne the patentee was required within a certain period (usually six months) after obtaining his patent to enrol at one of the public record offices a *specification* or description of his invention, upon the accuracy and sufficiency of which the validity of his grant in great measure depended. This practice had several grave disadvantages. There were three offices in which specifications might be enrolled—the Enrolment Office, the Rolls Chapel, and the Petty Bag Office; in each of these offices a laborious search might have to be made before a particular specification could be discovered and inspected. Again, the interval of time which elapsed between the grant of a patent and the enrolment of the specification enabled a patentee first to obtain protection for what might be merely

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a crude idea, and then to work out its details, altering and modifying them at will, during the protected interval. The Patent Law Amendment Act of 1852, adopting a practice which was in force in several continental countries, and which was strongly recommended by most of the witnesses who gave evidence before the committees of 1829 and 1851, provided that a petition for the grant of letters-patent should be accompanied by a statement in writing, describing the nature of the invention which it was sought to patent; this statement was called the *provisional specification*. The effect of the procedure prescribed by the act was that a patentee might use his invention for six months without prejudice to his patent by that user, but he obtained no rights against the public until his patent had been sealed. The patentee was merely protected against the consequences of his own publication, and enabled to employ workmen and obtain machinery without the risk of being betrayed.

The existing law of patents depends upon the Statute of Monopolies, the Patents Acts, 1883–88, and the Patents Rules, 1890, made by the Board of Trade under statutory authority. The present procedure to obtain a patent is as follows: An application signed by the inventor himself, and accompanied by a 'provisional specification,' in which the nature of his invention is briefly and generally described, is lodged at the Patent Office. The application and specification are then referred by the comptroller-general, who is the official head of the department, to an examiner who ascertains and reports to him whether (1) the nature of the invention has been fairly described, (2) the application, specification, and drawings, if any, have been prepared in the prescribed manner, (3) the title selected by the applicant sufficiently indicates the subject-matter of the invention, and (4) the specification does not describe more than one invention. No preliminary examination as to the novelty of the invention is held. The comptroller may, however, refuse to grant a patent for any invention of which the use would, in his opinion, be contrary to law or morality, and from such refusal no appeal can be taken. If the examiner report against the applicant on any of the grounds mentioned above, the comptroller may require the application, specification, or drawings to be amended before he proceeds with the application. Against this decision the applicant may appeal to the law officer, whose judgment is final. If, however, the examiner report in the affirmative upon each of the issues submitted to him, the application is accepted. Within nine months—a period which the comptroller may on payment of the prescribed fee extend to ten months—from the date of his application the applicant must deposit at the Patent Office a *complete specification*, particularly describing the nature of the invention and the best method of carrying it out. If the examiner report that the complete specification (1) does not fairly describe the invention, (2) does not terminate with a distinct claim or claims, (3) claims more than one invention, or (4) varies materially from the provisional, the comptroller may refuse to accept it unless and until it has been amended to his satisfaction. From such a refusal the applicant may appeal as before to the law officer, whose decision is final. When the complete specification has been accepted it is printed and published, and the details of the applicant's invention are then for the first time thrown open to public inspection. The comptroller-general causes the fact of the acceptance to be advertised in the official journal of the Patent Office, and the patent is not granted until after the expiration of two months from the date of such advertisement. At any time within that period any person may oppose the grant on any one or more of the following grounds: (1) that the applicant had obtained the invention from the opponent or from some person of whom the opponent is the legal representative; (2) that the invention had been patented in this country on an application of prior date; (3) that the complete specification describes or claims an invention other than that described in the provisional, *and* that such other invention forms the subject of an application made by the opponent in the interval between the leaving of the provisional and the leaving of the complete specification. No other ground of opposition is recognised. The opposition is heard and determined by the comptroller-general, whose decision may be appealed against to the law officer. In the event of there being no opposition, or of the opposition proving unsuccessful, the patent is issued under the seal of the Patent Office and bears the date of the original application. The term of the patent is fourteen years from its date. The grant extends to the United Kingdom and the Isle of Man, but not to the Channel Islands or to any of the British possessions or colonies. Under the Act of 1883 a patent lapses at the end of four years unless a certificate of renewal has been obtained on payment of the prescribed fee. The taxes payable for keeping up a patent amount to £150. The specification or drawings relating to a patent may be amended by leave of the comptroller-general after advertising and hearing any opposition to the proposed amendment. No amendment will, however, be sanctioned the effect of which is materially to enlarge the scope of the invention originally claimed. The comptroller-general and probably the Master of the Rolls have power to correct merely clerical errors. If a patentee both fails to work his invention himself and refuses to permit other persons to do so, the Board of Trade may compel him to grant licenses upon reasonable terms.

The infringement of a patent may be restrained by injunction, and punished by damages awarded in an action at law. A patent will be *revoked* —or, as it is termed in Scotland, *reduced*—if it is proved to the satisfaction of the proper court to have been obtained by fraud or false suggestion on the part of the patentee, or to lack the essential requisites of novelty and utility.

A patentee is not compelled to mark articles made according to his invention as 'patented.' But any person who represents that an article sold by him *is* patented, when in fact no patent has been granted for the same, is liable on summary conviction to a fine not exceeding £5.

Prior to 1835 the term of a patent could only be extended by a special act of parliament (cf. Edmunds' *Patents for Inventions*, pp. 373–376). But the frequency of applications for statutory assistance suggested the propriety of framing some general measure for the extension or prolongation of letters-patent, and Lord Brougham's Act was passed with that view. Other enactments, of which the interest is now chiefly historic, followed; and section 25 of the Act of 1883 completed the legislation upon this subject. The judicial committee of the Privy council has power to extend for a further period of seven, or in exceptional cases of fourteen, years the term of a patent which, although highly meritorious and useful, has not adequately remunerated the patentee, from circumstances beyond his control, during the original term. It is now the practice of the judicial committee to prolong letters-patent by ordering a *new grant* to be made for the extended term.

Patent Agents.—Before the Patent Law Amendment Act, 1852, only about 500 patents were taken out annually in England. The patent business of

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the country would not, therefore, support a separate profession; and the parliamentary reports of 1829 and 1851 throw a somewhat painful light on the proceedings of many of those persons who carried on the work of patent agents in connection with other callings. Under the Act of 1852, however, the number of patents annually obtained greatly increased; foreigners and British subjects abroad desired to patent their inventions more frequently than before, and consequently the work of the patent agent became a distinct profession. On the 12th of August 1882 an Institute of Patent Agents was incorporated under the Companies Acts, 1862 to 1880. The Patents Act, 1888 (sect. 1), created a Register of Patent Agents, on which every person who assumes the name of 'patent agent' after July 1, 1889, must be enrolled under a penalty not exceeding £20. *The Register of Patent Agents Rules*, issued by the Board of Trade, came into operation on 12th June 1889, and gave to the Institute of Patent Agents a practically complete control over the whole profession. A communication to a patent agent is not privileged from disclosure in a court of law, even although he be a solicitor.

The Patent Office.—All the formal, and much of the judicial, work connected with the grant of letters-patent for inventions is done at the Patent Office in Southampton Buildings, Chancery Lane, London. At the head of the whole department is an officer called the comptroller-general, who is appointed by, and responsible to, the Board of Trade, and is assisted by a staff of examiners, clerks, &c. In addition to his formal and judicial duties relating to applications, the comptroller attends to the Register of Patents, in which the names of patentees and notifications of all assignments and licenses must be entered, and prepares an annual report as to the work of the Patent Office, which is laid before both Houses of Parliament. The Patent Office contains a valuable free public library, which is ordinarily open from 10 A.M. to 10 P.M., and in which all the publications of the Patent Office—specifications, reports of cases, illustrated official journals, &c.—may be consulted.

Patents in the United States.—Before the Declaration of Independence patents were occasionally issued by the colonial governments; and the constitution of the United States expressly vested in congress powers 'to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.' The congress of 1790 passed an act regulating the issue of patents for inventions, requiring the would-be patentee to petition the Secretary of State, the Secretary of War, or the Attorney-general; with the approval of any two of these the description of the patent was certified by the Attorney-general, and the president directed the issuing of the patent. The patent was recorded in the office of the Secretary of State, and delivered to the patentee under the great seal of the United States. Under this law, which remained practically unchanged till 1836, patents were granted with little examination, and the responsibility of deciding whether the patentee had made out his case was left wholly to the courts—a system found to be inconvenient and unsatisfactory for the interests of the public. On occasion of a fire at the Patent Office, when many of the documents were destroyed, congress repealed former acts and established a new system, which remains in force till now. The general principles of the law are the same as in England, but the term for which patents are granted is seventeen years—longer than elsewhere. The Patent Office is attached to the department of the Secretary of the Interior. The commissioner, assistant-commissioner, and three examiners-in-chief are appointed by the president, with the consent of the senate. The chief clerk, a staff of a hundred examiners (principal, first assistants, second assistants, third assistants), draughtsmen, copyists, attendants, &c. are nominated by the commissioner of patents and approved by the Secretary of the Interior. The office publishes pamphlets on *The Patent Laws and Laws relating to the Registration of Trade-marks and Labels*, and *The Rules of Practice in the United States Patent Office*, which may be had on application. But inventors are recommended to secure the assistance of 'patent lawyers,' who are a distinct branch of the legal profession. The minimum expense may be stated at $60; but difficulties and references to various authorities may greatly increase the outlay. The number of patents issued in the United States greatly exceeds that of any other country. In 1837–46 the number was 5019; in 1847–56 it was 12,578; in the decade 1877–86 it was 169,478; in the century ending 10th April 1890 nearly 437,000 grants were made.

The International Convention.—It has long been the desire of inventors and legislators to bring about an assimilation of the patent laws of the world. As early as 1851 a society called the 'Association of Patentees' included in their list of proposed reforms in the patent law 'international arrangements for a mutual recognition of the rights of inventors.' Adopting in substance the views of Sir H. Bessemer, Sir William Armstrong, and Mr C. W. Siemens, the Select Committee of 1872 recommended that 'Her Majesty's government be requested to inquire of foreign and colonial governments how far they are ready to concur in international arrangements' in relation to the proposed international patent law. In accordance with this recommendation Earl Kimberley, then Colonial Secretary, directed the governors of the British colonies to ascertain the state of colonial opinion upon the subject. At the same time our representatives abroad were required by Lord Granville to prepare succinct reports upon the patent laws of the countries to which they were severally accredited, and these reports were published and laid before parliament in 1873 (C—741). The inquiries thus held showed that colonial and foreign official opinion was in the main favourable to the proposed change, and also that, all divergencies notwithstanding, there existed in the patent laws of the world ample materials out of which an international patent system might eventually be created. The International Congress at Vienna in 1873 and the Paris Congress, organised during the Exhibition of 1878, carried the movement forward; and on 20th March 1883 an 'International Convention for the Protection of Industrial Property' was signed at Paris. The plenipotentiaries of the contracting parties exchanged ratifications on 6th June 1884, and the convention came into effective operation a month later. The original signatories were Belgium, Brazil, Spain, France, Guatemala, Italy, Holland, Portugal, Salvador, Servia, and Switzerland. The accession of Great Britain was delayed until special statutory power had been given to the crown to allow the *ante-dating* of patents granted under the convention. The adhesion of Great Britain to the convention took place on 17th March 1884, and was formally accepted on the 2d of April following. The United States, Norway, Turkey, Tunis, New Zealand, and other countries have subsequently joined the International Union. Germany is the most important European state that still holds aloof. The principal changes introduced into our patent system by this important treaty are these: (1) Formerly a patentee could not import into some of the states now comprised in the union

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articles manufactured according to his patent in this and other countries without forfeiture of his rights. Free importation of such articles without the penalty of forfeiture is now allowed. (2) An applicant for a patent in any one of the contracting states may obtain protection for the same invention here at any time within seven months from the date of his foreign application. The subsequent application is *ante-dated* to the date of the first application, and is consequently not defeated by prior publication or user in the protected interval. The working of this provision may be best explained by a simple illustration. A, a French inventor, applies for a patent in Paris on 1st June 1890. At any time within seven months from that date he may apply to the English Patent Office to protect the same invention which he is patenting in France, *and the English application, and the patent granted thereunder, are dated back to the 1st of June.* The result is that A may, for almost seven months after his French application, publicly use his invention in England with perfect safety. No one can say that the patent subsequently granted to him is bad for want of novelty, because the patent ultimately bears the date of the 1st of June, and thus protects the period during which he was using the invention in England.

In connection with the International Convention an international office or bureau has been established at Berne in Switzerland. Its expenses are defrayed by the governments of all the contracting states, and it publishes a monthly periodical entitled *La Propriété Industrielle*, and devoted to the interests of the union. The convention provides for conferences being held successively in one of the contracting states by delegates from the said states with a view to perfect the system of the union. The first meeting took place at Rome in April and May 1886. The number of applications at the English Patent Office for protection under the convention amounted to twenty-six in 1887 and to seventy-one in 1888.

In some countries, such as the United States of America, the Patent Office inquires strictly into the novelty and utility of every invention submitted to it for protection. In others, such as France and Turkey, there is no preliminary examination as to novelty or utility. Indeed, in France the patentee, if he refers to his title at all, is obliged to add the words *sans garantie du gouvernement* or their initial letters, S.G.D.G. In most European states a patentee is compelled to 'work' his invention within a certain time prescribed by law or limited in the grant; but this regulation or *exploitation* law, as it is called, is usually enforced in cases of voluntary and unjustifiable inaction alone. In the United States *designs* are patentable, apparently with a view to the encouragement of the decorative arts. In Switzerland processes apparently cannot be patented. Russian patent law imposes restrictions on the patenting of inventions of war.

See Carpmael's *Patent Laws of the World* (1885), with its supplements, published under the auspices of the Institute of Patent Agents; Lewis Edmunds' *Law of Patents* (1890); W. C. Robinson's *Law of Patents* (3 vols. 1890); the Reports of the Parliamentary Committees (1829–87); the Reports of the Commissioners of Patents (1852–84), and by the Comptroller-general since 1884. See also COPYRIGHT, MONOPOLY, TRADE-MARKS.

Pater, WALTER, was born in London, August 4, 1839, and educated at King's School, Canterbury, and at Queen's College, Oxford, taking a classical second-class in 1862. He was elected to an open fellowship at Brasenose; has travelled in Italy, France, and Germany; and, both by his subtle critical insight and the exquisite finish of his style, has earned his rank among the best prose-writers of his time. With a wise reticence he has husbanded his gift, hence all his work maintains the same high level of excellence. His books are *Studies in the History of the Renaissance* (1873), a series of essays on art and letters, on such men as Leonardo, Botticelli, Joachim du Bellay, and others, written in exquisitely modulated prose, with faint traces of a conscious daintiness, from which he soon shook himself free; *Marius the Epicurean: his Sensations and Ideas* (2 vols. 1885), an imaginary biography of a young man brought up in Roman paganism, who passes through varied spiritual experiences, meets Marcus Aurelius himself, and at last, shortly before his unexpected death, makes acquaintance with the mysterious new eastern religion, yet without being profoundly influenced by it; *Imaginary Portraits* (1887) of Watteau, Denys l'Auxerrois, Sebastian van Storck, and Duke Carl, whose dream was 'to bring Apollo with his lyre to Germany' half a century at least before his time; and *Appreciations* (1889), a volume of admirable criticism on Charles Lamb, Wordsworth, Coleridge, Rossetti, Sir Thomas Browne, Blake, and on Style itself.

Pater'culus, MARCUS VELLEIUS, a Roman historian, born probably about 19 B.C. He served under Tiberius as prefect or legate in Germany, Pannonia, and Dalmatia, was quæstor in 7 A.D., and prætor in 15. He was alive in 30, and may have perished the year after as a friend of Sejanus. His *Historiæ Romanæ* is a compendium of universal, but more particularly of Roman history, in two books. The work, as we have it, is not complete, the beginning, and a portion following the 8th chapter, being wanting. The work is slovenly and superficial, marred moreover by inflated rhetoric as well as by ignorant errors, and by fulsome flatteries of Cæsar, Augustus, and Tiberius. The *editio princeps* appeared at Basel in 1520. Good editions are those of J. C. Orelli (1835), F. Kritz (1840–48), and C. Halm (1876).

Patere'ros were small pieces of ordnance, now obsolete, worked on swivels; most commonly used on board ships, where they were mounted on the gunwale, and discharged showers of old nails, &c. into hostile boats.

Paterno, a town of Sicily, 11 miles NW. of Catania, at the southern base of Mount Etna. Pop. 15,230.

Pater-Noster (Lat., 'Our Father'), called also THE LORD'S PRAYER, a short form of prayer suggested or prescribed by our Lord to his disciples (Matt. vi. 9–13; Luke, xi. 2–4) as the model according to which, in contrast with the prayers of the Pharisees, their petitions ought to be framed. The Pater-Noster has been accepted as, by excellence, the form of Christian prayer. It formed part of all the ancient liturgies, usually introduced with a preface, and said between the consecration of the elements and the communion, except the so-called Clementine liturgy, in which it does not appear at all, and the Abyssinian, in which it is said, as in the English, after the communion. St Gregory finally settled its place in the Roman Mass, immediately after the Canon and before the fraction. Whereas in the East it was said by both priest and people, in the Roman use it was recited by the priest alone. The Catechism of the Council of Trent contains a detailed exposition and commentary on it, and in all the services, not only of the Roman Missal, Breviary, Ritual, Processional, and Ordinal, but in all the occasional services prescribed from time to time, it is invariably introduced. In the Mass it is said aloud, but in the Breviary secretly, or with at most the first and concluding words said audibly. In the Rosary of the Virgin Mary it is combined

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with the Hail Mary (whence the larger beads of the 'Rosary' are sometimes called *Pater-Nosters*), and perhaps the most usual of the shorter devotions among Roman Catholics is the recitation of the 'Pater,' with one or more 'Ave Marias,' concluding with the Doxology. The Pater-Noster as commonly used by Protestants concludes with the clause, 'for Thine is the kingdom, the power, and the glory for ever [or, for ever and ever]. Amen,' but this is wanting in the most ancient authorities. This embolism or intercalated prayer occurs in all the liturgies, Roman, Mozarabic, Gallican, Greek, Coptic, and Armenian. Of the two gospels—that of Matthew and that of Luke—in which the prayer is contained, that of Luke has not this clause; and even in the gospel of Matthew it is found only in the later MSS., in which it cannot be doubted that it is a modern interpolation. It was retained, however, in Luther's German translation, in the Prayer-book (original) version, and in the English authorised version. In the revised version it is omitted both in Matthew and Luke; in Luke, 'which art in heaven,' the whole of the third petition, and 'deliver us from evil' are relegated to the margin; and in Matthew, 'deliver us from evil' is properly rendered 'deliver us from the evil one.'

Many polyglot collections of the Pater-Noster have been published from the 16th century downwards, the most remarkable of which are those of John Chamberlayne in 150 languages (1715), of Conrad Gesner in 200 (1748), and that of Padre Hervas in 307 (1787). There are expositions of the Lord's Prayer by Origen, Chrysostom, Gregory Nyssa, Cyprian, Luther, Leighton, and Tholuck. See Moses Margoliouth, *The Lord's Prayer no Adaptation of existing Jewish Petitions* (Lond. 1876).

Paterson, capital of Passaic county, New Jersey, is on the Passaic River (which here has a perpendicular fall of 50 feet), and on the Morris Canal (connecting it with the Delaware River), 15 miles by rail NW. of New York City. It contains several locomotive-works, an iron-forge and rolling-mill, and numerous manufactories of cotton, paper, and linen and woollen goods, &c.; but chiefly it is famous for its silk-factories. These considerably exceed 100 in number, and have made Paterson 'the Lyons of America.' Pop. (1870) 33,579; (1880) 51,031; (1890) 78,347.

Paterson, ROBERT, 'Old Mortality,' was born near Hawick in 1712 or 1715, and served his apprenticeship as a stone-mason to an elder brother near Lochmaben. He married soon after 1740, and, renting a quarry for himself, took to carrying gravestones into Galloway. From about 1758 he neglected to return to his wife and five children, and for upwards of forty years devoted himself to the task of repairing or erecting headstones to Covenanting martyrs, wherever such had been buried. So Joseph Train wrote to Scott, who tells how about 1800 he himself met 'Old Mortality' at Dunnottar, engaged 'in the usual business of his pilgrimage.' From the old man's son, however, Train got a different story, without a hint of Cameronian zeal. Paterson died at Bankend, 29th January 1801, and was buried at Caerlaverock, where a monument was erected to him by the Messrs Black in 1869.

See the Introduction (1830) to *Old Mortality*, and Dr Crawfurd Tait Ramage's *Drumlanrig Castle and the Douglases* (Dumfries, 1876).

Paterson, WILLIAM, the greatest commercial schemer of the 17th century, was, like Law, a Scotchman, and was born at Skipmire farm in Tinwald parish, Dumfriesshire, in April 1658. His early career is obscure, but it appears that he carried a pack through England, settled some time at Bristol, next lived in the Bahamas, whether as preacher or buccaneer, and here matured his famous Darien Scheme. Returning to Europe, he promoted his scheme in London, Hamburg, Amsterdam, and Berlin, made a fortune by commerce in London, founded the Hampstead Water Company in 1690, and projected the Bank of England, and was one of its first directors in 1694. Paterson next went to Edinburgh, and soon talked the whole nation into his Darien Scheme. He sailed with the expedition in a private capacity, shared all its troubles, and returned with its survivors a broken man, in December 1699. But his energy remained unabated. When in 1701 William resolved to carry the contest with Louis XIV. into the heart of Spanish America, Paterson was taken into the king's confidence, and but for his death might have seen his dreams of Darien realised. He had a considerable share in promoting the union of Scotland with England, and was elected to the first united parliament by the Dumfries burghs. By a special act of parliament in 1715, he was awarded £18,241 as indemnity for his losses by the Darien Scheme; but he did not live long to enjoy it, for he died on 22d January 1719. Paterson was no mere dreamer, but a far-seeing financier, and a free-trader before free-trade times.

See DARIEN SCHEME; the *Life of Paterson*, by S. Bannister (1858), editor of his *Works* (3 vols. 1859); and W. Pagan's *Birthplace and Parentage of W. Paterson* (Edin. 1865).

Pathans. See AFGHANISTAN.

Pathology (from the Gr. *pathos*, 'disease,' and *logos*, 'a discourse') is that department of medicine which treats of the doctrine of diseases, their nature, causes, symptoms, and progress. General pathology deals with disease or morbid processes in general, and special pathology with particular diseases. Pathology is also divided into internal and external, and into medical and surgical. Pathology may be treated as falling into the departments of nosology, ætiology, morbid anatomy or pathological anatomy, symptomatology, and therapeutics. Humoral pathology was based on the theory that all diseases were due to the disordered condition of the humours and fluids of the body. Cellular pathology, associated with the name of Virchow, gives prominence to the action of cells in the healthy and diseased functions of the body. See ANATOMY, DISEASE, MEDICINE, PHYSIOLOGY, and the articles on the several diseases in this work; also works on pathology by Wilks and Moxon (1875), Wagner (Eng. trans. 1876), Coats (1883), Delafield and Prudden (New York, 1885), Cornil and Ranvier (trans. 1886), Woodhead (1885), Ziegler (trans. 1883–86), Payne (1888), Hamilton (1889), Rindfleisch (trans. 1885), Sutton (1886).

Patiala, a native state in the Punjab, India, partly in the plain south of the Sutlej, partly amongst the hills near Simla. Pop. (1881) 1,467,433; area, 5887 sq. m. The capital, also called Patiala, has a pop. of 53,629.

Patkul. See CHARLES XII.

Patmore, COVENTRY KEARSEY DEIGHTON, poet, was born at Woodford in Essex, July 23, 1823, the son of P. G. Patmore, author of *Literary Reminiscences*. He published a volume of *Poems* in 1844, and three years later joined the staff of librarians in the British Museum, where he remained till 1868, when he purchased a small estate in Sussex. Soon after he settled at Hastings, where he built a large Catholic church. His second volume of poems, *Tamerton Church-tower*, &c. (1853), prepared the way for his greatest work, *The Angel in the House*, an elaborate, exquisite, and sincere poem of love from the domestic side, which has had a great popularity, but not beyond its deserts. It consists of four parts, all included under the general title for the first time in the edition of 1866: *The Betrothal*

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(1854), *The Espousals* (1856), *Faithful for Ever* (1860), and *The Victories of Love* (1863). A carefully revised edition of this poem was issued in his collected poems (1878 and 1886), preceded by an essay on *English Metrical Law*, and including also *The Unknown Eros, and other Odes*, published in 1877. Patmore edited the anthology entitled *The Children's Garland* (1862), the *Autobiography* of Barry Cornwall (1877), and the posthumous poems of his son, Henry Patmore (1884). *Florilegium Amantis*, a selection from his poems, was edited by R. Garnett in 1888.

Patmos, a rocky and barren island, of most irregular outline, in the Ægean Sea, one of the Sporades, lies to the south of Samos, and is now called Patino. Area, 16 sq. m. It is celebrated as the place to which the apostle John was exiled; in a cave here, it is said, he saw the visions recorded in the Book of Revelation. On the top of a mountain stands the famous monastery of 'John the Divine,' built in 1088. The island is under Turkish rule, but is inhabited by about 4000 Greeks, mostly sponge-fishers. See Tozer, *Islands of the Ægean* (1890); and the Marquis of Bute in the *Scottish Review*, v. 103.

Patna, called also AZIMABAD, a city of Bengal, 140 miles E. of Benares by rail, extends 9 miles along the Ganges and 2 miles back from the river; but the streets are narrow and crooked, and the houses mostly mean in appearance. Apart from the Gola or government granary (1786), the government opium-factories, Patna College, the shrine of Shah Arzani, the mosque of Sher Shah, a Roman Catholic church, and a Mohammedan college, there are no buildings of moment. Its railway communication, and its central position at the junction of three great rivers, the Son, the Gandak, and the Ganges, avennes for the traffic of the North-west Provinces, render Patna of great importance as a commercial centre. The chief imports are cotton goods, oil-seeds, salt, sugar, wheat, and other cereals; they reach an annual value of nearly 4 million sterling. The exports, principally oil-seeds and salt, with cotton, spices, English piece-goods, cocoa-nuts, and tobacco, exceed 6½ million sterling in value. Patna, under its early name of *Pataliputra*, is supposed to have been founded about 600 B.C. It was visited by Megasthenes, the Greek historian, about 300 B.C., and called Palibothra by him. In modern times Patna is notable as the scene of a massacre of British prisoners by Mir Kasim in 1763, which led to war and annexation by the English, and for the mutiny at Dinapur, the military station of Patna, in 1857. Patna ranks as the seventh city of India in point of population: pop. (1872) 158,900; (1881) 170,654.—The *district* has an area of 2079 sq. m., and a pop. (1881) of 1,756,856; the *division*, an area of 23,726 sq. m., and a pop. of 15,063,944.

Patna, a native state of the Central Provinces, India; area, 2399 sq. m.; pop. (1881) 257,959. It has been under the management of a British political agent since 1871. Patna, the chief town, has a pop. of 2053.

Patois, the French term for dialects of a language spoken especially by the uneducated. See DIALECT.

Paton, JOHN GIBSON, missionary to the New Hebrides, the son of a stocking-maker, was born in the parish of Kirkmahoe, Dumfriesshire, 24th May 1824. After some experience in Glasgow City Mission, he offered his services for the foreign mission field in connection with the Reformed Presbyterian Church, and on his ordination he settled down towards the end of 1858 amongst the cannibal natives of Tanna. Here he laboured amidst trials and difficulties till 1862, when he was forced to leave, owing to the hostility of the natives. For the next twenty years his work was on the neighbouring island of Aniwa, the whole population of which became Christian. Both by voice and pen he afterwards attracted public attention and sympathy towards this field of mission labour; and his brother published and edited his graphic and thrilling missionary narratives, 1st and 2d series (1890). In 1891 he was made a D.D. of Edinburgh.

Paton, SIR NOEL, painter, was born in Dunfermline, 13th December 1821, and studied for a time at the Royal Academy, London. His cartoon sketch, 'The Spirit of Religion,' gained one of the three premiums at the Westminster Hall competition in 1845. Two years thereafter his oil-picture of 'Christ bearing the Cross' and his 'Reconciliation of Oberon and Titania' jointly gained the prize of £300. The latter and its companion-picture, the 'Quarrel of Oberon and Titania,' are now in the National Gallery at Edinburgh. 'Dante Meditating the Episode of Francesca' was exhibited in Edinburgh in 1852; the 'Dead Lady' in 1854; and 'The Pursuit of Pleasure' in 1855. Scenes from fairyland and from ancient legend, and religious and mystical allegory, painted with grace, tenderness, and something of over-refinement, have made his work familiar, and have been often engraved. Among his other pictures are 'Home from the Crimea;' 'In Memoriam,' a scene from the Indian Mutiny; a series of six picture-illustrations of the 'Dowie Dens o' Yarrow;' 'Luther at Erfurt;' 'The Fairy Raid;' 'Faith and Reason;' 'Gethsemane;' 'Christ and Mary at the Sepulchre;' 'The Man of Sorrows;' 'Mors Janua Vitæ;' 'The Spirit of Twilight;' 'Thy Will be Done' (1879); 'Beati Mundo Corde' (1891), &c. He has illustrated Aytoun's *Lays of the Scottish Cavaliers*, and in 1864 he executed twenty illustrations of the *Ancient Mariner*. He is an R.S.A., was appointed Queen's Limner for Scotland in 1865, received the honour of knighthood in 1867, and in 1876 was made an LL.D. of Edinburgh. He has published two volumes of poems.

Patras, or PATRÆ, a fortified seaport town and the most important in the west of Greece, climbs up a hillside and spreads out at its foot on the eastern shore of the Gulf of Patras, by rail 81 miles W. by N. of Corinth and 137 W. by N. of Athens. It is a handsome city, having been almost entirely rebuilt after the ravages of the war of liberation (1821). It is defended by a citadel, is the seat of an archbishop, and has a spacious new harbour (1880) protected by a mole. It ships great quantities of currants, chiefly to Great Britain and France, the former taking from 50,000 to 60,000 and the latter from 18,000 to 38,000 tons annually. Besides currants, olive-oil, wine, valonia, &c. are exported. The imports embrace chiefly woollen and cotton goods, iron, machinery, coal. British ships import goods to the annual value of £246,400, and carry away exports to £1,173,060. Pop. (1879) 25,494; (1889) 44,970. *Patræ* is the only one of the 'twelve cities' of Achaia which still exists as a town; but most of its relics have been swept away by earthquake (551, 1820) and siege (by the Spaniards in 1532 and 1595, by the Knights of St John in 1603, and by the Greeks, 1822–28). It was an early seat of Christianity, having an archbishop before 347.

Patria Potestas. See FAMILY, PARENT AND CHILD.

Patriarch (Gr. *patriarchēs*, 'the head of a tribe') is the name given to the heads of the families in the antediluvian period of Scripture history, and is still more familiar as the designation in Jewish history of the three progenitors of the Jewish people, Abraham, Isaac, and Jacob.

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In the later history of the Jews, too, after the destruction of Jerusalem, the Greek name was used to designate the heads of the college which was regarded as a continuation of the old Sanhedrim; one of whom, the patriarch of the west, resided at Tiberias, in Galilee, and the other, the patriarch of the Eastern Jews, at Babylon. The patriarch of Tiberias was also regarded by the Roman imperial government as municipal head of the Jews of Palestine. The most familiar use of the word, however, is in the history of the Christian church. It is the name given to the bishops of certain great metropolitan sees, who not only held rank beyond other metropolitans, but also enjoyed a jurisdiction over all the metropolitans included in their district almost identical with that of the metropolitan in his own province. It is certain that the name and the office were both recognised before the Council of Nice, at which time, as we learn from the sixth canon, the patriarchal sees, acknowledged by 'ancient custom,' were three in number, Rome, Antioch, and Alexandria. After the translation of the seat of empire to Byzantium, thenceforward called Constantinople, that see, originally subject to the metropolitan of Heraclea, obtained metropolitan and afterwards patriarchal rank, and eventually established a precedency over the patriarchs of Antioch and Alexandria, being second only to Rome. The contests between the patriarchs of Rome and Constantinople were among the chief causes of the Greek Schism. To these four patriarchates was added a fifth in the year 451, that of Jerusalem, which was formed out of the ancient patriarchate of Antioch. The limits of these five patriarchates can only be loosely assigned. After the Greek Schism, and particularly after the establishment of the Latin Kingdom of Jerusalem, Latin prelates were appointed with the title and rank of patriarch in the four great Eastern sees resident at Rome; in 1847 the Latin patriarch took up his residence in Jerusalem. The Catholic Church also recognises Maronite, Melchite, and Syrian patriarchs of Antioch, an Armenian patriarch of Cilicia, and a Chaldaic patriarch of Babylon. There are also minor patriarchs of Venice, of Spain, and of the Indies. For the patriarchs of the Orthodox Eastern Church, see GREEK CHURCH.

Patrician (Lat. *patricius*, from *pater*, 'father'), a name given to the members of Roman *gentes* of whom the *populus Romanus* originally consisted, and to their descendants by blood and adoption. On the establishment of the plebeians as a distinct order, sharing certain rights with the patricians, the patriciate became an aristocracy of birth, in the exclusive possession of a number of important privileges. A long struggle between the two orders ended in the attainment by the plebeians of a political equality, and the establishment of a new aristocracy of *nobiles* based on wealth and office (see NOBILITY, ROME). Under Constantine the dignity of *patricius* became a personal title; not hereditary, but conferring very high honour and certain privileges. The popes in after times conferred the same title on eminent persons and princes; and elsewhere also the title of patrician was bestowed on distinguished subjects.

Patrick, ST., a distinguished missionary of the 5th century, commonly known as the Apostle of Ireland. There is some uncertainty as to the date and place of his birth. His birth is assigned to the year 372 by Ussher (*Eccl. Brit. Antiq.*, in vi. pp. 375–380, with which compare Wh. Stokes's Introduction to *Tripartite Life of St Patrick*, p. cxxxvii., Rolls series, Lond. 1887). Of the place, it is only known for certain, from his own Confession, that his father had a small farm near Bannavem Tabernie; and in one of the ancient lives he is said to have been born at Nemthur. Arguing on these data, together with other collateral indications, some writers assign his birthplace to the present Boulogne-sur-Mer; others to a place on the estuary of the Clyde (called from him Kilpatrick) near Dumbarton. His father, as he himself tells, was a deacon named Calpurnius, and his grandfather, Potitus, a priest; his mother, according to the ancient biographers, was named Conches or Conchessa, and was a sister of St Martin of Tours. Patrick's original Celtic name is said to have been Succat, Patricius being his Latin designation. In his sixteenth year he was seized, while at his father's farm of Bannavem Tabernie, by a band of pirates, and with a number of others was carried to Ireland and sold to a petty chief, in whose service he remained for six years. This chief's name was Miluic or Milchu. He lived in the valley of the Braid near Slemish Mountain, just outside the town of Broughshane, in the centre of the County Antrim, where a town-land called Bally-lig-patrick ('the town of Patrick's hollow') still preserves the memory of his residence. This district of Antrim was then famous for its piratical expeditions into Britain, as the vast finds of Roman coins all along the Antrim coast as far as Coleraine amply prove. After six years Patrick succeeded in effecting his escape, and, probably after a second captivity, went to France, where he became a monk, first at Tours and afterwards in the celebrated monastery of Lerins, which was then the residence of John Cassian, the admirer of Egyptian monasticism, and of vast numbers of Egyptian monks; hence the numerous points of contact with Egyptian customs which have been noticed in the ancient Irish Church (see IRELAND, Vol. VI. p. 210, G. T. Stokes's *Celtic Church*, p. 188, and Butler's *Coptic Churches*, passim). In the year 432 he went as a missionary to Ireland when sixty years of age, after he had been ordained by an unknown Gallic bishop named Matorix or Amatorix, or else by Germanus of Auxerre; Palladius, who had been sent by Pope Celestine as missionary to that country a short time before, having died. He seems to have been made a bishop in his forty-fifth year.

The leading facts of Patrick's life in Ireland as they are collected out of the various documents are these. He sailed from France to Wales or Ireland. The Welsh claim that he landed in Wales before he went to Ireland (see Giraldus Cambrensis, iii. 379, Rolls series). The communication, however, between Wales and the east coast of Ireland has been very frequent from the earliest ages. He first landed as a missionary in Ireland at the town of Wicklow at the mouth of the river Vartry; thence he sailed north to convert his old master Milchu, who destroyed himself at his approach. Milchu was a chief of Northern Dalriada, a district which extended from the middle of Antrim to Newry. In the County Down, in the south of the same Dalriada, he converted another chief named Dichu, who bestowed upon him the first Christian church that St Patrick possessed. It was called Sabhall (Saul) or 'the barn,' and it is still a church called by exactly the same name. St Patrick then set out to Tara in the County Meath, which was at that period the central point of meeting for all the tribes of Ireland. There he preached to the king of Tara, Laoghaire, or Leary (as the name should be pronounced), where Patrick is said to have used the shamrock to illustrate the doctrine of the Trinity; this is, however, a mere modern legend. Thence he proceeded to Connaught, as far as Croagh-Patrick in Mayo, to Ulster, and as far as Cashel in the south. We can trace his footsteps in all these directions by the topography of the country as well as by the documents which are extant. His mission was eminently

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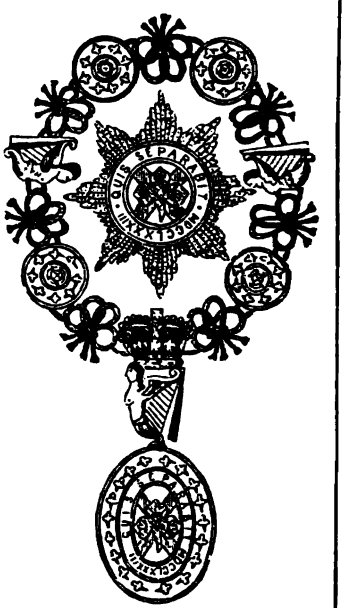
successful. He adopted the expedient of addressing himself first to the chiefs, and of improving, as far as possible, the spirit of clanship and other existing usages of the Irish for the furtherance of his preaching; nor can it be doubted that he had much success in Christianising the ancient Irish system of belief and of practice. According to the accounts of his Irish biographers, he founded 365 churches and baptised with his own hand 12,000 persons. He is said also to have consecrated 450 bishops, ordained a vast number of priests, and to have blessed very many monks and nuns. After he had been some twenty years engaged in his missionary enterprise, he is said to have fixed his see at Armagh about the year 454, where he held probably more than one synod, the decrees of which have been a subject of much controversy. He died at Saul, the spot which Dichu had given him on his first arrival, and was buried at Downpatrick, where his relics were preserved down to the period of the Reformation. The place is still venerated by the people. The date of his death is much disputed, the Bollandists placing it in 460, while Ussher holds it to have been 493. Dr Todd inclines strongly to the latter opinion, in which case Patrick's age would have been quite 120. The only certainly authentic literary remains of St Patrick are his 'Confession' and a letter, both of very rude Latinity, but of much historical interest. The letter is addressed to Coroticus, by some supposed to have been a Welsh chieftain named Caradoc (from whom Cardigan is named), by others regarded as a pirate chief from near Dumbarton (W. Stokes's *Tripartite Life of St Patrick*, Introd. p. c.), who had made a descent on the Irish coast, and slain or carried off, with circumstances of great cruelty, a number of the Irish, many of whom were neophytes. These, with some other remains ascribed to him, as also decrees of synods, were published in Wilkins' *Concilia*, and separately by Ware, *Opuscula S. Patricii* (1656). The Book of Armagh is in MS. in Trinity College, Dublin, dating from the 8th century. The copy in it of St Patrick's Confession claims to have been made from St Patrick's autograph. For this MS., see Stokes's *Celtic Church*.

A good biography of St Patrick is that of the Rev. J. H. Todd (Dublin, 1863); a more recent one is by E. J. Newell (1890). The best and latest edition of all the documents concerning St Patrick is Dr Whitley Stokes's two vols. in the Rolls series (1887) styled the *Tripartite Life of St Patrick*, where every fragment bearing upon his history has been industriously gathered and critically estimated. Dr Whitley Stokes has there printed the documents from the Book of Armagh which are the earliest authentic notices of the saint, and the foundation upon which all later lives have been built.

Patrick, SIMON, a learned English divine, born at Gainsborough in Lincolnshire, 8th September 1626, was educated at Queen's College, Cambridge, and was successively rector of St Paul's, Covent Garden (1662), where he laboured heroically through the horrors of the Great Plague, Dean of Peterborough (1678), Bishop of Chichester (1689) and of Ely (1691). He died May 31, 1707. A theologian no less devout than erudite, an ecclesiastic of wide sympathies and large sagacity, he established a solid reputation by his excellent sermons, of which may be selected for special mention that preached at the funeral of John Smith of Cambridge, printed with Smith's *Select Discourses;* his admirable if sometimes prolix devotional and expository treatises, some of which are still read; and his sound and frequently reprinted paraphrases and commentaries on the historical and poetical books of Scripture from Genesis to Canticles (10 vols. 1695–1710). Of the expository works may here merely be named *A Brief Exposition of the Ten Commandments and the Lord's Prayer, The Parable of the Pilgrims, The Heart's Ease, The Christian Sacrifice, Advice to a Friend, The Devout Christian Instructed,* and *Jesus and the Resurrection Justified.* His *Autobiography* was first printed at Oxford in 1839, and is included in the complete Oxford Clarendon Press edition of his works, edited by the Rev. Alexander Taylor (9 vols. 1858).

Patrick, THE MOST ILLUSTRIOUS ORDER OF ST., a national order of knighthood for Ireland, established by George III. on the 5th of February 1783, and enlarged in 1833. It now consists of the Sovereign, the Grand-master (the lord-lieutenant of Ireland for the time being), and twenty-two Knights. The *Collar* of the order (of gold) is composed of roses alternating with harps, tied together with a knot of gold, the roses being enamelled alternately white within red, and red within white; and in the centre is an imperial crown surmounting a harp of gold, from which the badge is suspended. The *Badge* or *Jewel* is of gold, and oval; surrounding it is a wreath of shamrock proper on a gold field; within this is a band of sky-blue enamel charged with the motto of the order, QUIS SEPARABIT MDCCLXXXIII., in gold letters; and within this band a saltire gules (the cross of St Patrick), surmounted by a shamrock or trefoil slipped vert, having on each of its leaves an imperial crown or. The field of the cross is either argent or pierced and left open. A sky-blue *Ribbon*, worn over the right shoulder, sustains the badge when the collar is not worn. The *Star*, worn on the left side, differs from the badge only in being circular in place of oval, and in substituting for the exterior wreath of shamrocks eight rays of silver, four of which are larger than the other four. The order is indicated by the initials K.P.



Order of St Patrick.

Patripassians (Lat. *pater*, 'father,' and *passus*, 'suffered'), a name given to one of the earliest classes of anti-Trinitarian sectaries (2d century), who, in maintaining the oneness of the Godhead, were said by their enemies to believe that, as it was true to say that Jesus, in whom dwelt the Logos, or the Son, suffered, therefore it would be true to say that the Father suffered. Their principles are in the main the same with those of the Sabellians (q.v.).

Patristic Literature. See FATHERS OF THE CHURCH, and separate articles.

Patroclus. See ACHILLES.

Patron (Lat. *patronus*, from *pater*, 'father'), among the Romans originally signified a citizen who had dependents, who were called *clients*, attached to him. Before the time of the Laws of the Twelve Tables, the most frequent use of the term *patronus* was in opposition to *libertus*, these

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two words being used to signify persons who stood to one another in the relation of master and manumitted slave. The original idea of a patron apart from the manumitter of slaves continued to exist. A Roman citizen, desirous of a protector, might attach himself to a patron, whose client he thenceforward became; the patron was the guardian of his client's interest, public and private; as his legal adviser he vindicated his rights before the courts of law. The client was bound on various occasions to assist the patron with money, as by paying the costs of his suits, contributing to the marriage portions of his daughters, and defraying in part the expenses incurred in the discharge of public functions (see ROME). As the patron was in the habit of appearing in support of his clients in courts of justice, the word *patronus* acquired in course of time the signification of advocate or legal adviser and defender, the client being the party defended. *Patron* in after times became a common designation of every protector or powerful promoter of the interests of another; and the saints who were believed to watch over the interests of particular persons, places, trades, &c. acquired in the middle ages the designation of their patron saints.

The term Patron has also been applied to those who endowed or supported churches and convents. The question of ecclesiastical patronage, or the right of the patron to present to livings, is dealt with in ADVOWSON, FREE CHURCH, INVESTITURE, SCOTLAND (CHURCH OF), STATE CHURCH.

Patterson-Bonaparte. See BONAPARTE, Vol. II. p. 288.

Patteson, JOHN COLERIDGE, the martyr-bishop, was born in London on 1st April 1827, the son of Sir John Patteson, judge in the Queen's Bench, and of a niece of Coleridge the poet. He passed through Eton and Balliol College, Oxford, and was elected a Fellow of Merton in 1852, and in the following year appointed curate of Alfington, near Ottery St Mary, in Devonshire. But his thoughts soon turned to missionary work, and in 1855 he sailed with Bishop Selwyn of New Zealand. The next sixteen years he spent amongst the Melanesian Islands—New Hebrides, Banks, Solomon, and Loyalty Islands; and in 1861 he was consecrated Bishop of Melanesia. A most unselfish man and a true Christian, he was greatly beloved by the islanders, whom he likewise loved and faithfully watched over, protecting them to his utmost against the white kidnappers of the Pacific. He was killed by the natives of Nukapu, one of the Santa Cruz group, on 20th September 1871, it is believed in revenge for relatives carried away by the white 'slavers.' See Life by Miss Yonge (2 vols. 1874).

Patti, ADELINA, prima-donna, was born at Madrid, 19th February 1843, the daughter of a Sicilian tenor and the 'Signora Barilli,' a Roman. At seven she sang 'Casta Diva' in Tripler Hall, New York; and in the same city she made her operatic début as 'Lucia' in 1859. In London she first appeared in 1861 as 'Amina' in *La Sonnambula*, when her success was as splendid as it had been in America, and as it since has been wherever she has sung—Paris, St Petersburg, both the Americas, &c. In Russia, in 1870, she received from the emperor the Order of Merit. Her voice is an unusually high soprano, reaching to F in alt, of rich bell-like tone and remarkable evenness; to these qualities she adds purity of style and the highest artistic finish. Equally at home in the tenderness of deep passion and the sprightly vivacity of comedy, she has also sung splendidly in oratorio. She married in 1866 the Marquis de Caux, and, on her divorce from him in 1886, the tenor Ernesto Nicolini. Her home is Craig-y-nos Castle, near Swansea.—Her elder sister, CARLOTTA, born at Florence in 1840, was likewise a very fine vocalist, though a slight lameness prevented her from appearing much in opera. She made her début at New York as a concert-singer in 1861, married in 1879 the 'cellist Ernst de Munck, and died at Paris, 28th June 1889. See Engel's *From Mozart to Mario* (1886).

Pattison, MARK, scholar, was born in 1813 at Hornby in Yorkshire, but brought up mostly at Hauxwell, of which parish his father had become rector. The eldest of twelve children, of whom ten were daughters, he grew up amid the Yorkshire moors, with a close knowledge of nature and a love for field-sports, which in the one form of fishing lingered with him till the last. He was educated at home until he entered Oriel College at Oxford in 1832. A shy and awkward lad, diffident and hesitating, without the wholesome discipline of public school life, he suffered much in his first years as an undergraduate, but his sufferings were the fruit of his own lack of self-reliance, his morbid self-consciousness, and hyper-sensitiveness of temperament. He took his bachelor's degree in 1837 with a second-class in classics, and was elected Fellow of Lincoln College in 1839. Under the dominant influence of Newman he gave himself first to the study of theology, twice (1841–42) carried off the Denyer prize, wrote two *Lives of the Saints*, translated for the 'Library of the Fathers' the Matthew in the *Catena Aurea* of Aquinas, and almost followed his master into the fold of Rome, being saved only, as he himself explains, by his habits of study and a constitutional slowness to act. Fortunately we have his own account of his spiritual growth, out of the Puritanism of his home into the wider atmosphere of Anglicanism, and how that in its turn fell from him as the larger horizon of the Catholic Church opened itself up before his eyes, only to disappear before 'the highest development, when all religions appear in their historical light as efforts of the human spirit to come to an understanding with that Unseen Power whose presence it feels, but whose motives are a riddle.' His reaction from Newmanism reawakened within him all his zeal for pure scholarship, and, no less lofty in his ideal of the teacher than the student, he soon became a tutor of altogether exceptional devotion and influence, and acting head of the college as sub-rector, under the aged Dr Tatham. On the death of the latter in 1851 Pattison was kept out of the headship which was his right by a discreditable obscurantist intrigue, which gave an almost paralysing blow to his sensitive nature. A further unsuccessful attempt was made to deprive him of his fellowship on the technical plea that he had not proceeded in time to the degree of B.D., and the result of his disappointment was that for ten years he took little real interest in the life of Oxford, while his ideas of university reform henceforth grew rather towards an increase of the professorial than the tutorial system. But his educational sympathies soon extended far beyond mere college life; he published an article on education in the *Oxford Essays*, acted as assistant-commissioner on the Duke of Newcastle's Commission of Inquiry into Elementary Education in Germany, rambled in the long vacations through England, Scotland, and Germany, visiting most of the universities of the latter country, and served for three months of 1858 as *Times* correspondent at Berlin. Meanwhile he gave himself with rare devotion to severe and unbroken study, and scholars soon came to recognise his Roman hand in the columns of the *Quarterly*, the *Westminster*, and the *Saturday Review*. His luminous and thoughtful *Report on Elementary Education in Protestant*

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Germany appeared in 1859; his equally learned and temperate paper on 'Tendencies of Religious Thought in England, 1688–1750,' in *Essays and Reviews* (1860). At length in 1861 he was elected Rector, but, though he made an exemplary head, the spring and elasticity of earlier days were gone. In 1862 he married the accomplished Emilia Frances Strong, afterwards Lady Dilke, who helped him to make Lincoln a social and intellectual centre for a world much wider than the walls of Oxford. Down to his last illness and his death at Harrogate, 30th July 1884, he lived wholly for study, maintaining a mediæval rather than modern ideal of the life of the scholar as a sufficient end in itself.

Everything Mark Pattison wrote was characteristic; nowhere else among contemporaries could be found such fullness of knowledge and earnestness of thought, shaped ever into terse and vigorous English. Yet his standard of perfection was so high that his actual achievement is far more suggestive than demonstrative of his powers, and the greatest project of his life—the study of Scaliger—remains a fragment, printed by Professor Nettleship in vol. i. of Pattison's collected *Essays* (1889).

Besides the books already named he published *Suggestions on Academical Organisation* (1868); admirably annotated editions of Pope's *Essay on Man* (1869) and *Satires and Epistles* (1872); *Isaac Casaubon, 1559–1614* (1875), which grew out of his Scaliger studies; *Milton*, almost the best book in the 'English Men of Letters' series (1879); the *Sonnets* of Milton (1883); and *Sermons* (1885). His posthumous *Memoirs* (1885) was a strikingly frank judgment of himself and others—even his own father—and a remarkable revelation of a singular moral and intellectual personality, describing, 'without restraint, the whole current of his thoughts and feelings from 1832 to 1860.'

Dora Wyndlow Pattison, his sister, was born at Hauxwell, January 16, 1832, the youngest but one of her father's family. She grew up amid her native Yorkshire moors a handsome and healthy girl of remarkable humour, spirit, and vigour, and had her young enthusiasm kindled by the heroic devotion of Florence Nightingale. In October 1861, against the advice of all her family, she started a life of labour for others as schoolmistress at Little Woolston, near Bletchley, and in the autumn of 1864 joined the sisterhood of the Good Samaritans at Coatham, near Redcar. Here 'Sister Dora' underwent severe discipline, but found solace in devoted labours as a nurse, first at North Ormesby, near Middlesborough, and in 1865 at Walsall. Ere long she gave herself entirely to hospital work, and her absolute self-forgetfulness, patience, gentleness, and skill quickly brought her the adoration of the saint from the rough men and women for whom she gave her life. The severest toil, and even the horrors of smallpox in 1868, and anew in 1875, she braved with the serene enthusiasm of her nature, and hundreds of the most brutalised drunkards and harlots of the Black Country were lifted by the example of her life and the magnetic influence of her personality into new and undreamt of horizons of moral and religious duty. But even her uncommon strength at last gave way, and she died a true martyr for Christ's sake at Walsall, December 24, 1878. The whole population of the town followed her body to the grave, and the working-men erected a monument to her memory in 1886.

See *Sister Dora: A Biography*, by Margaret Lonsdale (1880)—a sincere and veracious book, which Mark Pattison, with a characteristic touch, terms 'Miss Lonsdale's romance.'

Pau, the chief town of the French department of Basses-Pyrénées, on the right bank of the Gave-de-Pau, 66 miles by rail ESE. of Bayonne and 143 SSE. of Bordeaux. It occupies a rocky height, 623 feet above sea-level, and commands towards the south most magnificent views of the serrated Pyrenees; indeed, for mountain scenery its situation is surpassed by no other town in France. The ancient capital of the kingdom of Béarn and French Navarre, it has a noble five-towered castle, rising to a height of 110 feet. Rebuilt about 1363 by Gaston Phœbus, Comte de Foix, and restored by Louis-Philippe and Napoleon III., this castle was the birthplace of Henri IV., as also of his mother Jeanne d'Albret; and Abd-el-Kader was a prisoner here in 1848. Bernadotte was likewise a native of Pau, which, beyond a statue of King Henri (1848), has nothing else calling for notice. Linen and chocolate are its chief manufactures; and in the vicinity Jurançon wine (good but strong) is grown, and many swine are fed, whose pork supplies the famous 'Jambons de Bayonne.' Pau is a great English resort, especially during the winter season (October to May), and is famous for its golf-links. Pop. (1872) 25,607; (1886) 28,664. See Count Henry Russell, *Pau, Biarritz, and the Pyrenees* (new ed. 1891).

Pauillac, a port on the left bank of the estuary of the Gironde in France, 30 miles N. by W. of Bordeaux by rail, is the place from which the best brands of Médoc (claret) are shipped to Bordeaux. Pop. 2216.

Paul. It is probable that no man ever swayed the religious opinions and destinies of mankind so powerfully as Paul of Tarsus, the Apostle of the Gentiles. He was greater than some of the greatest servants of Christ in many single capacities; a greater preacher than Chrysostom, a greater missionary than St Francis Xavier, a greater theologian than St Thomas of Aquinum, a greater reformer than Luther, a greater organiser than St Gregory the Great. Collectively he exercised over the world a mightier influence not only than all of these put together, but even than his fellow apostles St Peter and St John. The secrets of his unparalleled success were—regarded on their human side—the secrets of all success in the field of religious effort—burning zeal, absolute self-sacrifice, undaunted courage, and a strong conviction that he was fulfilling a ministry to which he had received a special call from God.

Our chief and all but exclusive authorities for his life are the Acts of the Apostles and his own epistles. The few particulars added by Christian tradition are highly dubious, and the calumnious inventions of Talmudic malice and Ebionite heresy may be dismissed with silent contempt. Paley in his *Horæ Paulinæ* has shown with wonderful skill and originality how remarkably the credibility of St Luke's history is supported by authentic touches of autobiography, even in cases where there is a seeming and superficial discrepancy. He shows us that even the undesigned coincidences can be counted by scores. From combination of the two sources we are able to arrive at a true picture and estimate, though both are entirely fragmentary. The life of St Paul is like a manuscript of which the beginning and end are irrecoverably lost. All that we really know of his life lies in the thirty years between 36 A.D. and 66 A.D., which form its central period. We can only form slight and uncertain conjectures respecting Paul's childhood, youth, and early manhood, and respecting all that befell him after St Luke drops the curtain upon his first Roman imprisonment with the words, 'teaching with all boldness unmolestedly.' But even in this central period the records are quite fragmentary. In 2 Cor. xi. 24–33, written about 57 A.D., some ten years before his death, St Paul briefly alludes to the strange and severe diversity of his trials; and yet of those which he mentions

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no less than eleven specific trials are not so much as alluded to in the Acts. St Luke does not mention one of the five scourgings with Jewish thongs; only one of the three flagellations with Roman rods; not one of the three shipwrecks, though he minutely describes a fourth. He makes no allusion to the 'night and day in the deep,' and only mentions two of what Clement of Rome tells us were seven imprisonments. Nor, again, does St Luke refer to any one of the perils of watercourses, perils of robbers, perils in the wilderness, perils among false brethren, hunger, thirst, fasting, cold, and nakedness, for which we can only find places in the travels of the apostle by reproducing in imagination the character of the countries through which he made his long and toilsome journeys.

St Jerome, perhaps following a true but confused and anachronistic tradition, says that St Paul was born at Giscala in Galilee, and taken by his parents to Tarsus of Cilicia in early infancy. The conjectural date of his birth is about 3 A.D. Tarsus was at that time 'no mean city.' It was beautifully situated on the river Cydnus, and was a centre not only of political power and commercial enterprise, but also of learning and philosophy. He grew up in the midst of paganism, but was trained 'a Hebrew of the Hebrews,' in profound acquaintance with the Jewish Scriptures, and with some slight knowledge of classical literature. Being of the tribe of Benjamin, he received the famous tribal name of Saul. Tarsus was only an *urbs libera*, but in some unknown way St Paul was a Roman citizen, and it has been conjectured that his father may have been one of the Tarsians carried by Cassius to Rome, and may there have obtained the *civitas*. He was sent, probably as a boy, to relatives at Jerusalem, where in after days he seems to have had a married sister. He there became an illustrious and learned Pharisee of the famous school of the Rabban Gamaliel (q.v.), a grandson of the sweet and noble Hillel. At the feet of this eminent doctor he sat for many years, endeavouring to attain to the legal blamelessness which was the ideal of Pharisaic virtue, but which could give little satisfaction to his deepest yearnings. It was hardly wonderful that he should have imbibed the spirit of fanatical hatred against that new and immeasurable force of the gospel, which to a Pharisee seemed to involve the overthrow of all his most cherished idols and formalities. If, as he seems to imply, he had a vote in the Sanhedrin (Acts, xxvi. 10), he must have been married; and from the context of 1 Cor. vii. 8 it has been inferred that he was a widower, and remained a widower by choice (1 Cor. ix. 5). Gamaliel approved of the wise policy of toleration; but Saul, less wise herein than his teacher, was hurried by what he himself afterwards and remorsefully described as a spirit of frenzied rage (Acts, xxvi. 11) into the attitude of a most violent persecutor. He haled men and even women to prison, hunted them out for punishment through every synagogue, scourged them (Acts, xxii. 4), voted for their execution, and did his best to make them blaspheme. The persecution culminated in the martyrdom of St Stephen by stoning, and on this occasion the executioners laid their garments at the feet of Saul. Fanaticism enabled him to witness that horrible death, but he was haunted long years afterwards by the memory of the angel face (Acts, vi. 15), the light of which he had seen quenched in blood (Acts, vii. 58–60, xxii. 20; 1 Cor. xv. 9; Gal. i. 13).

When he had finished his bad work as an inquisitor at Jerusalem, and had, as he hoped, extirpated the odious sect of Nazarenes, he obtained letters of authorisation from the high-priest, and went as commissioner of the Sanhedrin to root them out from Damascus. On his journey he met the crisis of his fate. He was, as he regarded it, arrested—apprehended by Christ, dashed to the ground, taken captive, led in triumph, branded as a slave with the stigmata of the Lord Jesus, when the dazzling vision, which outshone the Syrian noon, wrapped him as in a blinding sheet of flame, and filled him with the unalterable conviction that he had both seen and heard his risen Lord. From that moment he was a changed man. He felt that the fire of God had melted the iron sinews, and the hammer of God had shattered the stony heart. What is certain is that from that time forth the proud man became utterly humble, and the fierce persecutor a tender-hearted evangelist. The hard and self-sufficient Rabbi, abandoning for ever his national arrogance, his rabbinic wisdom, his legal scrupulosity, became thenceforth the suffering and despised preacher of an executed faith.

It is needless to follow in detail the further narrative of the Acts or the personal indications of the epistles. Healed by Ananias of his temporary blindness, he retired for about three years to Arabia, and then returning to Damascus began powerfully to preach the gospel which he had heretofore toiled to destroy. Driven from Damascus by Jewish animosity, he contrived to escape down the city wall in a basket, and made his way to Jerusalem, where, as was natural, he was received with coldness and suspicion, until Barnabas generously intervened to remove the prejudices of the brethren. After a trance and vision in the temple, in which his future destiny was foreshadowed to him, he was driven to Tarsus by a plot to murder him, and there he stayed with his family, waiting and preparing for his work. Meanwhile the capital of Christianity was being gradually transferred from Jerusalem to Antioch, and Barnabas, realising the importance of the vast sphere of labour which was there opening before him, set out to seek Paul as his fellow-labourer. At Antioch he laboured for a year with ever-widening influence, and went to Jerusalem with Barnabas in the year 44 to carry contributions to the necessitous mother-church. Soon after his return began the first stirring of the missionary spirit, and Barnabas and Saul were set apart by divine consecration to preach Christ to the Jew first and afterwards to the Gentile. They set forth accompanied by Mark, who was the cousin (Col. iv. 10) of Barnabas, and sailed to Cyprus, where they converted the proconsul Sergius Paulus, and confounded the false prophet Elymas, by whom he had been duped. From that time Saul assumes the Gentile name of Paul. Thence they sailed to Perga, and travelled through the passes of the Taurus to the Pisidian Antioch. Driven from thence, and afterwards from Iconium, by the jealous fury of the Jews at the success of their preaching among the Gentiles, they went to Lystra, where, healing a cripple, they were at first taken for gods; but a revulsion of feeling against them was again caused by the Jews, and Paul was stoned and left for dead. It is probable that he carried with him to the grave the marks of this cruel martyrdom; but at Lystra he had the happiness of winning a young convert named Timotheus, the beloved son and companion of many later trials and travels, even to the end of his life. From Lystra they fled secretly to Derbe, and thence retraced their steps to Antioch, appointing in each place elders over the infant churches. Such was the first flight of the eagle, the first journey of Christian missionaries. It confirmed Paul in his destined work as the Apostle of the Gentiles.

Shortly after their return to the Syrian Antioch the church began to be troubled by the Pharisaic

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converts, who wished to reduce Christianity to the level of a local faction by forcing on Gentile converts the crushing yoke of Jewish circumcision. It is difficult after the lapse of ages to estimate the daring courage and originality which it then required to pronounce obsolete and abrogated, and to characterise as 'weak and beggarly elements,' what all Jews regarded as the infinitely sacred and eternally inspired institutions of that Mosaic ceremonialism which had covered religion with the scurf of petty obligations indefinitely multiplied by tradition and the oral law. But Paul took this part boldly and decisively from the first and at all costs—willingly facing the obloquy heaped upon him as a renegade and a seducer of the people—he carried out to the end the indignant battle which saved Christianity from being degraded into a narrow sect and made it the universal religion of spiritual freedom. It was necessary for Paul and Barnabas to visit Jerusalem to obtain from the first church synod the decision of this great question, and the victory gained in that synod, mainly by the genius of St Paul aided by the manly convictions of St Peter, is the most momentous in the history of early Christianity. It was indeed only a partial victory in the form of a local decision; but it practically conceded the main point of issue, and enabled St Paul to enforce on reluctant Judaists the emancipation of their Gentile brethren from a host of worrying restrictions, which, if unabolished, would have been justly fatal to the spread of Christianity. How strained were the relations between the two divisions of the church we see from the fact that shortly afterwards at Antioch Paul had to rebuke even the chief of the apostles publicly for something like tergiversation, into which he had been led for a moment by fear of his Jewish co-religionists. This was never forgotten, and we see from the Pseudo-Clementine writings that perhaps a century later there were Judaising heretics who because of it dared to indulge in malignant calumnies against St Paul.

It was shortly after this memorable scene that St Paul's missionary ardour led him to propose to Barnabas another evangelistic journey. The wish of Barnabas to take with him his cousin Mark, and Paul's disinclination to admit the companionship of one who in his judgment had put his hand to the plough and looked back in the first journey, led to a sad disagreement between the two friends. This ended in a life-long separation, though much later Paul desired the presence of Mark at Rome because he found him profitable for the ministry. Paul, with Silas as his companion, went through the Cilician Gates to Derbe and Lystra. At Lystra he circumcised and ordained Timothy, who continued to be his dearest companion for many years. Thence they went through Phrygia and Galatia, preaching and founding churches. In Galatia Paul had a severe illness, in which he was cheered by the bright enthusiasm of his Galatian converts. Thence, by providential intimation, they were led to Troas, and there St Paul was joined by St Luke, and saw the vision of the 'man of Macedonia,' which led to the momentous decision to carry the gospel into Europe. They sailed to Neapolis, and were received at Philippi by the generous hospitality of Lydia. The church here founded was the most beloved by St Paul of all his infant communities. The healing of the girl with 'a spirit of divination' led to an uproar, in which Paul and Silas were unjustly and illegally scourged and imprisoned. An earthquake in the night alarmed the Philippian prætors, and the two prisoners, who had converted their gaoler, were honourably dismissed. They went to Thessalonica, and founded another church, where Paul, who was generally able to support himself by his trade of tent-maker, was aided by the generous Philippians. Another riot, stirred up by Jewish jealousy, compelled their flight to Berœa, from which St Paul was again driven by Jewish machinations, and made his way to Athens. He preached on the Areopagus amid the jeers of Stoics and Epicureans, but won some important converts, and proceeded to Corinth. There, with the aid of his fellow tent-makers, Aquila and Priscilla, he founded an important church; but another riot arose in which both Jews and Greeks were involved, which was treated with disdainful indifference by the proconsul Gallio, the brother of Seneca.

After a stay of some months at Corinth, he revisited Jerusalem (his fourth visit), touching at Ephesus on the way. After saluting the church at Jerusalem he went back to Antioch, whence, after a period of rest, he started on his third great missionary journey. He confirmed the churches of Galatia and Phrygia, and then went to Ephesus, where he made a full convert of the eloquent Apollos, and stayed for two years. The immense success of his preaching led to the riot of the silversmiths in the theatre. Compelled to fly, he made his way to Troas and retraced his steps through Macedonia as far as Illyricum, and thence to Corinth. It was during this period that he wrote his most important group of epistles. He was greatly occupied also in raising a contribution for the perennial destitution of the mother-church at Jerusalem, which was taken thither by chosen delegates of the contributing churches. A sudden plot of the Jews to murder him compelled him to return through Macedonia. He spent the Passover with Luke at Philippi, sailed to Troas, where he raised Eutychus from death, and then among the isles of Greece to Miletus, where he had an affecting parting with the elders of the Ephesian Church. A voyage past Coos, Rhodes, and Patara brought him to Tyre, where he was warmly welcomed by the church, and parted from them in prayer on the seashore. At Cæsarea he stayed in the house of Philip the Evangelist, and thence, in spite of the warnings of the prophet Agabus, went up to Jerusalem for his fifth visit. He was the guest of Mnason of Cyprus, and was received by James, the Lord's brother, and the elders, to whom he handed over the Gentile contributions, in accordance with the old instructions of the synod of Jerusalem, 'to be mindful of the poor.' Afraid that his presence in the Holy City might arouse tumults among the Jewish fanatics, St James suggested to him that he should take a share in the expenses of a Nazarite vow. The suggestion turned out unfortunately. He was recognised in the Court of the Women, and charged with having taken Trophimus, a Gentile Ephesian, into the temple. He was rescued from the brutal fury of the mob by the chief captain Lysias, who, taking him for an impostor, was on the point of having him scourged, when he discovered that he was a Roman citizen. Under the protection of the Romans he was tried before the Sanhedrin, but threw the assembly into a tumult by taking advantage of the rivalry between the Pharisees and Sadducees. Amid these perils a vision assured him that he should yet preach the word in Rome. Discovering that forty Jews had bound themselves under a curse to assassinate Paul, Lysias sent him to the procurator Felix at Cæsarea. He was tried before Felix, and made a deep impression; but, as he had no money to bribe the avaricious governor, he was left two years in prison. He was then tried afresh by the fair and energetic Festus, who also gave him an opportunity of pleading his cause before King Agrippa II. and Berenice. Weary, however, with the long and unjust detention, he had appealed to Cæsar, and

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Festus sent him, in charge of the centurion Julius, to Rome. St Luke, who, with Aristarchus, was his companion, gives us a minute account of the voyage to Myra, and thence in an Alexandrian wheat-ship to Crete, where they lay windbound at Fair Havens. Continuing the voyage in spite of Paul's warning, the crew were caught in a cyclone called Euro-aquilo, and the ship, in spite of undergirding and every other precaution, became a complete wreck. Amid the despair and misery of all on board, St Paul, comforted by a vision, assured them of their safety, and though the vessel finally became a total wreck at Ras el Koura, in Malta, every life was saved. At Malta he waited three months for another ship. He was held in great honour by the barbarous natives because he had shaken a viper off his hand unhurt, and healed the father of Publius, the Protos of Malta. The prisoners were taken to Italy on board the *Castor and Pollux*, and landed at Puteoli, proceeding by land to Rome. Paul was met by Christian brethren at Appii Forum and the Three Taverns, and went along the Appian Road to the capital, where he was handed over to the *observatio* of Afranius Burrus, the prætorian prefect. For two years he continued a prisoner at Rome, and, as the Jews refused to accept his preaching, he did what he could to make the gospel known to the Gentiles, gaining converts even among the prætorian soldiers and the slaves of Cæsar's household, and being suffered to live in his own hired apartment, under the supervision of the soldiers. From the pastoral epistles we securely infer that his trial ended in a complete acquittal. His next movements are uncertain, but we find traces of his probable visits to Colossæ, Crete, and Nicopolis, and of his final arrest in the house of Carpus at Troas. He seems to have been tried and imprisoned at Ephesus, and again sent to Rome. Meanwhile the Neronian persecution had broken out, and his second imprisonment, in which nearly all deserted him, was far more imperilled and miserable than the first.

At his first trial—perhaps before Nero in person—he seems to have been remanded; but at a second trial we learn from unanimous Christian tradition that he was condemned to martyrdom, probably, as he was a Roman citizen, by decapitation. His 'trophy,' or martyr's memorial, was a familiar object in Rome in the 2d century, but his death was so lonely and unrecorded that not even tradition has preserved a single trustworthy detail respecting it. All that we can see from his last writings is that he remained heroic, indomitable, cheerful, faithful to the end, never doubting, amid an apparent failure which the world might well have regarded as absolute, that the hundredfold harvest of eternity would spring up from the grain which he had sown in tears. Yet it is unlikely that even he, on this side the grave, was at all able to estimate the far-reaching grandeur and many-sidedness of the work which it had been given him to do. He had set an example of life-long zeal and devotion in the willing endurance of numberless perils and privations, such as has never been equalled, much less surpassed; and he had done this with a mind acutely sensitive to the blasts of hatred which came to him from every region of the Jewish and Gentile world, and with a body weakened by chronic disease. He had formulated the language and systematised the doctrines of theology. He had saved the gospel from dwindling into a Pharisaic Judaism, and had established for ever its freedom from the yoke of priestly and ceremonial bondage. He had carried the faith over a vast extent of Asia from Jerusalem to Antioch, to Ephesus, to Macedonia, to Athens and Corinth, to Rome, and perhaps even 'to the farthest limit of the west.' He had been the founder of many flourishing churches. He had written epistles of various orders, of which even the most casual is 'weighty and powerful,' and which constitute him one of the greatest moral and spiritual teachers whom the human race has ever seen.

It only remains to glance at these epistles. They are thirteen in number, and fall into four well-marked chronological and doctrinal groups. The first group (1, 2 Thess., written 52–53 A.D., during the second missionary journey) are mainly eschatological, and represent St Paul's earliest stage of thought. The second group, written during the third missionary journey, may be called broadly epistles of Judaic controversy. 1 Corinthians (written at Ephesus in 57) is mainly polemical and ecclesiastical. 2 Corinthians (written at Philippi in 58?) is the apostle's *Apologia pro Vitâ Suâ*. Galatians and Romans (written at Corinth in 58) are mainly doctrinal and soteriological. The third group are the epistles written during St Paul's first imprisonment at Rome. Philippians (62) is personal and ethical. Colossians and Ephesians (63) are Christological, Ephesians being especially the epistle of the ascension. Philemon is an exquisite personal epistle, the first charter of emancipation, and was written (63) as a sort of annex to the Epistle to the Colossians. The fourth group contains the pastoral epistles of St Paul's closing years. 1 Timothy and Titus may have been written in Macedonia about 66, 2 Tim. about 67 in Rome.

They may also be classified according to their forms, as (1) Circular letters to the churches (Eph. and Romans), which are rather treatises than letters; (2) Letters to special churches, or little groups of churches (1 and 2 Thess., 1 and 2 Cor., Philip., Col., and Gal.); (3) Letters to friends (Philemon, Titus, 1 and 2 Tim.).

The genuineness of some of these epistles has been fiercely contested. Four (1 and 2 Cor., Gal., and Romans) are absolute *homologoumena*, of which not even the school of Tübingen questioned the genuineness; but they regarded 1 and 2 Thess., Philippians, Ephesians, Colossians, and Philemon as *antilegomena*, of uncertain authenticity, and the three pastoral epistles as spurious. The Christian church has amply met the arguments against the authenticity of all the epistles, and even Renan only rejects the pastoral epistles, and that mainly on historic and chronological grounds, because with many others he holds that St Paul perished in the Neronian persecution in 64 A.D.

The mission of St Paul was fourfold. Had he done nothing more than set the world an example of saintly self-sacrifice, his work would have been sufficiently memorable to make him immortal; but besides this he was a missionary, a moralist, a reformer, and a theologian.

(1) Of his missionary work we have spoken, and have shown that to him pre-eminently belongs the honour of having made known the gospel to the civilised world around the basin of the Mediterranean; so that before his death the Christians had grown from a little community of 120 Galileans in an upper room at Jerusalem into a number of flourishing Asiatic and European churches, and even in that early day Christ had His followers in the Prætorian camp at Rome, and in Cæsar's household.

(2) As a moralist St Paul laid down, with incomparable clearness, the relations of ethics to the gospel, and the secret of the loftiest moral standard as rendered possible by the new life. No moralist before him had more distinctly illustrated the eternal principles taught by Christ, by showing their bearing on the simplest concrete duties of life. To take but one example—no moralist ever dealt with the duty of purity, so universally

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ignored in the ancient civilisations, with such unrivalled delicacy yet with such absolute precision. By insisting on the new truth, 'Know ye not that your bodies are the temples of the Holy Ghost, who dwelleth in you?' he placed chastity on a wholly new basis, and contributed indefinite force and meaning to Christ's elucidation of the duties implied in the seventh commandment as extending even to the thoughts of the heart.

(3) As a reformer St Paul not only relieved the world from that yoke of petty Levitic observances which even St Peter pronounced to have been intolerable, but he emancipated all true religion from the burden of external Pharisaic restrictions, from all oral laws and traditions of the elders, and ecclesiastical tyrannies of ceremonialism, and all terror of humanly-invented sins. He was the divinely-appointed champion of the principle 'Ye shall know the truth, and the truth shall make you free.' This is the keynote of one of his most important epistles—that to the Galatians—in which he alludes no less than eleven times to the privilege and duty of 'standing fast in the liberty wherewith Christ hath made us free' (Gal. ii. 4; iii. 28; iv. 22, 23, 26, 30, 31; v. 1, 13). Hence this epistle powerfully swayed Wyclif, Huss, Savonarola, Luther, Tyndale, Wesley, and all great religious reformers. The truths which Luther learned from it became in his hands the instrument for the deliverance of the church from the tyranny of Rome. 'The Epistle to the Galatians,' he said, 'is my epistle. I have betrothed myself to it. It is my wife.' Bengel calls this epistle 'the sum and marrow of Christianity,' and says of v. 1-6 'in these stands all Christianity.'

(4) In the Epistle to the Galatians we also find the germ of that great doctrinal system which makes St Paul the chief founder of Christian theology. In the doctrinal section of the epistle (iii. 1–iv. 30) he had proved the doctrine of our justification by faith. He had shown that justification is not attainable by outward ordinances. His proofs had been drawn from the Christian consciousness (iii. 1–5), from the Old Testament (iii. 6–18), and by establishing the secondary position of the law both objectively (iii. 19–29) and subjectively (iv. 1–18). In the Epistle to the Romans, which was probably a circular treatise, sent round with different appendices of personal greetings to various churches, the theme of justification is more systematically worked out. The keynote of that epistle is the recurrent word *all*, as illustrative of the spiritual universality of the gospel to meet the universality of man's need for the gospel. In this epistle the four main positions are (1) all are guilty before God; (2) all need a saviour; (3) Christ died for all; (4) we are all one body in Him. In Adam all are equally guilty (i. 18–iii. 20), in Christ all are equally redeemed (iii. 21–30). The grand fundamental theme of the epistle is given in Rom. i. 16, 17. It is stated not as a *doctrine* of sin, or a *theory* of imputations, or a theological shibboleth, but as a momentous practical truth. The elements of that great summary are (1) justification; the righteousness of God imputed to man; (2) faith; man's belief, rising first to self-surrender, then to mystic union with Christ, which becomes the germ of a new life in the heart; (3) this plan of salvation by free grace is offered gratuitously to all; (4) the object of this faith is Jesus Christ, whose life and death are for man a ransom and a propitiation; (5) Christ's sacrifice was necessary as a vindication of God's righteousness in the pretermission of past sins; (6) the end to be obtained was that God might justify every man whose root of life is faith in Christ.

St Paul dwelt therefore on three cardinal points —the Grace of God, the Redemption of Christ, the Faith of Man. Luther rediscovered this truth theoretically by reading the epistles to the Romans and Galatians in the library of his monastery at Erfurt, experimentally by the facts of his own religious life. Wesley learned it, partly from the Moravians, and partly from Luther's commentary on the Galatians, after his return from Georgia. But this cardinal doctrine of justification by faith is ignorantly misunderstood and perilously misinterpreted when faith is confused with mere belief. Hooker (*Eccles. Pol.* I. xi. 6) long ago corrected this error; and of recent critics, both Baur (*Paul*, ii. 149) and Pfleiderer (*Paulinismus*, sect. 5) have given the true meaning of St Paul. Baur shows how faith, beginning in hearing, and becoming faith in *Christ* (Gal. ii. 16, iii. 26), and more especially in *Christ's blood* (i.e. the communication to man of His essential life, Rom. iii. 24–27), becomes more intense as it narrows from stage to stage, and passes from theoretic consent to dominant conviction. Pfleiderer shows that there are ascending degrees and qualities of faith, passing from *dead* faith, which produces no works, and theoretic persuasion, first into faithfulness and moral surrender, and then into *mystic union with Christ*, which does not remain receptive, but becomes the spirit of life—a living power and impulse (1 Cor. vi. 17), so that, in its true sense, as Luther says, 'Faith is a divine work in us, which changes us and creates us anew in God.' The modern sense of faith as a body of doctrines (*the* faith) may, in this connection, be left out of sight altogether, since the word is only thus used in the Pastoral Epistles.

(5) But complete as is St Paul's statement of this central doctrine, which he characterised as *his* gospel (Rom. ii. 16, xvi. 25; Gal. i. 7, ii. 2; 2 Tim. ii. 8)—complete, that is, so far as we can give such a title to truths which touch, on every side, upon insoluble mysteries—we are thankful that the same essential truths are represented in a less controversial and more directly spiritual form in the epistles of the captivity—those especially to the Ephesians and Colossians. The mind of St Paul—as we see at once when we read his epistles in chronological order—was not only intensely susceptible to surrounding conditions of life and controversy, but was also one which was constantly in a state of growth and progress. The theodicy which he had been led to formulate in the 'storm and stress' of Judaic controversy assumed larger, richer, less rigid and antagonistic forms when he had to wean the infant church from the dangerous glamour of incipient Gnostic heresies. Olshausen calls the epistles to the Romans and Galatians soteriological—i.e. they contain, so to speak, the philosophy of the plan of salvation; and the epistles to the Colossians and Ephesians Christological—i.e. they insist on the immediate relation of the soul and of the church to Christ. The epistles are closely connected, though that to the Colossians is less exquisite and gracious than that to the Ephesians, which may well be called the Epistle of the Ascension, the Epistle of 'the heavenlies.' The idea of the Epistle to the Colossians is 'Christ all in all,' and its moral is summed up in the words 'Walk in Him, in Him alone.' The idea of the Epistle to the Ephesians is Christ in the universal church. In the Epistle to the Romans the doctrine of salvation is set forth psychologically. It is built on the moral facts of the universality of sin, the insufficiency of man, the justification of the believer by union with Christ. In the later epistles the statement of the doctrine is theologic. Christ is set forth as the central being of the universe, and we see God's eternal plans realised by the unity of redeemed humanity in Christ with the family of heaven in the heavenlies.

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Round these central truths all the other views of St Paul are crystallised. The fierce disputes in which rival dogmatists—St Augustine and Pelagius, the Jesuits and Jansenists, the Calvinists and Arminians, and many others—have combated over his opinions arise from the futile attempt to systematise exorbitant inferences drawn from isolated phrases, to build upon their apexes inverted pyramids of argument, to obscure the whole heaven of Christianity with smoke made to issue 'from the narrow aperture of single texts.' Such attempts must always fail. St Paul's letters were *écrits de circonstance*. They were casual; they were fragmentary; they were the outcome of the special conditions with which they immediately dealt. St Paul 'never recoils before a paradox;' he never cares to remove an apparent contradiction; he knew that truths which apparently contradict others are often complementary truths; he leaves side by side the apparent antinomies which arise from the contact of finite reason with infinite truth. He was well aware that when reason steps beyond the limits of experience it comes into collision with mysteries not only insoluble, but apparently opposite to each other. Since *omnia exeunt in mysterium*, he was not concerned to reconcile the opposite facts of predestination and free-will; of universal restoration and a twofold end of probation, of the necessity for human effort and yet its ineffectualness. He knew that such antinomies involve no perplexity in the region of practical life. While he created the language of Christian theology, and often embraces a whole world of thought in a single word, he lends no sanction to the theological controversialists who, with mutual bitterness, have persisted in rending Christendom asunder by pursuing the great saving truths of religion into speculative extremes.

The literature bearing on St Paul is vast in extent; the following are merely the names of the more important modern books: (1) LIFE.—K. Schrader, *Der Apostel Paulus* (1830–36); Neander, *Gesch. der Pflanzung u. Leitung der Christl. Kirche durch die Apostel* (vol. i. 1832; Eng. trans. 1851); F. C. Baur, *Paulus der Apostel Jesu Christi* (1845; 2d ed. by Zeller, 1866; Eng. trans. 1873–75); A. Hausrath, *Der Apostel Paulus* (1865; 2d ed. 1872); Ch. F. Trip, *Paulus nach der Apostelgeschichte* (1866); Renan, *Les Apôtres* (1866) and *Saint Paul* (1869); F. Bungener, *S. Paul, sa Vie, son Œuvre, ses Épîtres* (1867); M. Krenkel, *Paulus, der Apostel der Heiden* (1869); W. J. Conybeare and J. S. Howson, *The Life and Epistles of St Paul* (1852); F. W. Farrar, *The Life and Work of St Paul* (1879); Lewin, *The Life and Epistles of St Paul* (1851; new ed. 1874); and good shorter studies by O. H. Taylor (1884), J. Stalker (1884), and Professor Iverach (1891).

(2) THEOLOGY.—Ritschl, *Die Entstehung der Altkatholischen Kirche* (2d ed. 1857); A. Sabatier, *L'Apôtre Paul* (1870; 2d ed. 1881); K. Holsten, *Zum Evangelium des Paulus u. Petrus* (1868), and *Das Evangelium des Paulus dargestellt* (1880 *et seq.*); R. Schmidt, *Die Paulinische Christologie* (1870); O. Pfleiderer, *Der Paulinismus* (1873; 2d ed. 1890; Eng. trans. 1877), and *Hibbert Lectures* (1885); Ernesti, *Die Ethik des Apostels Paulus* (1868; 3d ed. 1880); J. H. Scholten, *Das Paulinische Evangelium* (1881); E. Menegoz, *Le Péché et la Rédemption d'après St Paul* (1882); H. Gunkel, *Die Wirkungen des Heil. Geistes nach der popul. Anschauung der Apostol. Zeit. u. nach der Lehre des Apost. Paulus* (1888); and Ch. Rogge, *Die Anschauung des Apostels Paulus von die relig.-sittl. Char. des Heidenthums* (1888); also the general works on the theology of the New Testament by Chr. F. Schmid (edited by Weizsäcker, 1853), Baur (1864), B. Weiss (1868; Eng. trans. 1888–89), and J. J. van Oosterzee (1869; 2d ed. 1886).

See also the relevant parts of the *Introductions* of Bleek, Weiss, S. Davidson, Salmon, Holtzmann, &c.; and especially the works devoted to the *Acts* by Overbeck (1870, in De Wette), Zeller (1854; Eng. trans. 1875–76), H. Wendt (1888, in Meyer), and K. Schmidt (vol. i. 1892); also C. Weizsäcker, *Das Apostol. Zeitalter der Christl. Kirche* (1886). See also the countless Commentaries on the individual epistles of St Paul, the names of which will be found under the special articles thereon. Of these may here merely be mentioned, as masterpieces in their kind, those of Godet on *Romans* and *Corinthians*, and Lightfoot on *Philippians*, *Galatians*, *Colossians*, and *Philemon*.

Specially noteworthy articles on St Paul are those by Hausrath in Schenkel's *Bibel-Lexicon*; Beyschlag in Riehm's *Handwörterb. des bibl. Alterthums*; Lange in the first edition of Herzog's *Real-Encyklopädie*, W. Schmidt in the second edition; and Hatch in the *Encyclopædia Britannica* (9th ed.). The so-called Tübingen theory of the fundamental distinction between the Pauline and Petrine parties in the early church is maintained in the books by Baur (q.v.), Holsten, Zeller, and Scholten, already mentioned. See the article CHRISTIANITY in the present work.

Paul was the name of five popes. PAUL I. (757–767) and PAUL II. (1464–71) were unimportant. PAUL III., Alessandro Farnese, reigned from 1534 to 1549, during a very critical period for the papacy. He was born at Carino in Tuscany in 1468, and was created cardinal-deacon in 1493 by Alexander VI., who had illicit relations with his sister. He showed great powers of diplomacy, and on the death of Clement VII. in 1534 was elected pope. One of his first acts was to give cardinals' hats to two of his boy-grandsons, and throughout his reign he laboured to advance his sons; but his ambitious schemes to secure Parma and Piacenza to the debauched Pietro Luigi were at length frustrated. Yet in other respects he was a wise pontiff, and he had the prudence to surround his throne with good cardinals like Contarini, Pole, and Sadolet. He convoked a general council to meet at Mantua in 1542, but it did not actually assemble (in Trent) until 1545. The bull of excommunication and deposition which he issued in 1538 against Henry VIII. of England is a late example of the exercise of the temporal power claimed by the mediæval popes. The bull instituting the order of the Jesuits (1540) is important as marking the beginning of the Roman counter-reformation. In the contest of Charles V. with the Protestant League in Germany Paul sent a large force to support the emperor, and he opposed the pacification proposed by him upon the basis of the Interim. And in the struggle between the emperor and Francis I. he tried to trim in order to save the peace of Italy and the interests of his bastards. He died suddenly, November 10, 1549.

PAUL IV., named Giovanni Pietro Caraffa, a member of the noble family of that name, was born in Naples in 1476. His early career was distinguished for ascetic rigour. He was appointed Bishop of Chieti, in which see he laboured most earnestly for the reformation of abuses, and for the revival of religion and morality. With this view he established, in conjunction with several congenial reformers, the congregation of secular clergy called Theatines, and was himself the first superior. He showed himself the most rigorous enemy of heresy, and it was under his influence that Paul III. organised the tribunal of the Inquisition in Rome. On the death of Marcellus II. in 1555, although in his seventy-ninth year, he was elected to succeed. He enforced vigorously upon the clergy the observance of all the clerical duties, and enacted laws for the maintenance of public morality. He established a censorship, was the first to issue a full official *Index librorum prohibitorum*, and completed the organisation of the Roman Inquisition; he took measures for the alleviation of the burdens of the poorer classes, and for the better administration of justice, not sparing even his own nephews, whom he banished from Rome on account of their corrupt conduct and profligate life. His foreign relations, too, involved him in much labour and perplexity.

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He was embroiled with the Emperor Ferdinand, with Philip II. of Spain, with Cosmo, grand-duke of Tuscany. Under the weight of so many cares his strength gave way, and he died, August 18, 1559. His severity had been hateful to the Roman citizens, who hailed the news of his death with delight.

PAUL V., originally named Camillo Borghese, was born in Rome in 1552. In his early life he was a distinguished canonist and theologian; and, after the ordinary prelatical career at Rome, he rose first to the post of nuncio at the Spanish court, and afterwards to the cardinalate under Clement VIII. On the death of Leo XI. in 1605 Cardinal Borghese was elected to succeed him. His pontificate is rendered memorable by the celebrated conflict with the republic of Venice, into which he was plunged at the very outset of his reign. The original ground of dispute was the question of the immunity from the jurisdiction of civil tribunals conceded to the clergy, who claimed to be tried by ecclesiastical tribunals alone. This claim the senate resisted; and further causes of dispute were added by a mortmain law, and a law prohibiting the establishment of new religious orders or associations unless with the sanction of the senate. Each party remaining inflexible in its determination, Paul issued a brief, directing a sentence of excommunication against the doge and senate, and placing the republic under an interdict, unless submission should be made within twenty-four days. The senate persisted, and an animated conflict, as well of acts as of writings, ensued, in the latter of which the celebrated Fra Paolo Sarpi, on the side of the republic, and on the papal side Bellarmine and Baronius were the leaders. By the intervention of Henry IV. of France the dispute was accommodated in 1607, but not until the pope had been compelled to abandon his claims. Paul's administration was vigorous on behalf of orthodoxy, and he did a great deal for the promotion of useful public works, for the embellishment of the city, the restoration and preservation of antiquities, the improvement of the museums and libraries, and, above all, for the pious and charitable institutions of Rome. Paul died January 28, 1621, and was succeeded by Gregory XV. See T. A. Trollope's *Paul the Pope, and Paul the Friar* (1860).

Paul, emperor of Russia, the second son of the unfortunate Peter III. and the Empress Catharine II., was born October 2, 1754, became heir-apparent on the death of his elder brother in 1763, and succeeded his mother on the imperial throne in 1796. The tragical death of his father when he was still a child, and his mother's neglect, exerted a baneful influence on the character of Paul, who was kept in seclusion while Catharine and her favourites governed. His earliest measures were the exile of his father's murderers, and the pardon of Polish prisoners, including Kosciusko. But he soon revealed his capricious and violent temper, as well as his lack of capacity, and irritated all classes of his subjects by vexatious and imperious regulations. Not less unhappy and variable was his foreign policy. After beginning with an attitude of neutrality in the war between France and the rest of Europe, he suddenly declared in favour of the allied powers, and sent an army of 56,000 men under Suvaroff into Italy. Encouraged by his success, he despatched a second army of equal strength to co-operate with the Austrians, but its defeat in 1799 induced him to recall Suvaroff; whereupon he retired from the allied coalition without giving any reason, quarrelled with England, and entered into a close alliance with the First Consul Bonaparte. Paul now concluded a convention with Sweden and Denmark for the purpose of opposing the right insisted on by England of searching neutral vessels, with the result that the English government sent a fleet into the Baltic under Nelson to dissolve the coalition, at the close of March 1801. He was about to help the Danes, when a conspiracy was formed against him at St Petersburg. Among the conspirators were Count Pahlen, General Bennigsen, and other distinguished officers, and their aim was originally only to compel Paul to abdicate; but a scuffle arose in which the emperor was strangled, March 24, 1801.

Paul, CANONS OF ST. See BARNABITES.

Paul OF SAMOSATA, the Socinus of the 3d century, was born at Samosata on the Euphrates, capital of a district of Syria, and in 260 became bishop or patriarch of Antioch, the most important see of the East. Antioch then belonged to the Palmyrene kingdom, and Paul was practically the vicegerent of Queen Zenobia, from whom he received support in the maintenance of his heresy. This was monarchianism—the doctrine that Father, Son, and Holy Ghost are the one God, and that the Father has from all eternity produced the Logos, who is his Son, but is rather an attribute than a person. Antioch being recaptured by Aurelian in 272, Paul's enemies procured his deposition by the heathen emperor; but his doctrines survived, and he had followers, Paulianists or Samosatensians, till the 4th century.

Paul, VINCENT DE. See VINCENT DE PAUL.

Paula. See FRANCESCO DI PAULA.

Paulding, JAMES KIRKE, an American author, was born in Dutchess county, New York, August 22, 1779. Self-educated, he early showed a tendency to literature, and, being a friend of Washington Irving, wrote a portion of *Salmagundi*. During the war of 1812 he published the *Diverting History of John Bull and Brother Jonathan;* and in 1814 a more serious work, *The United States and England*, a defence against articles in the *Quarterly Review*. This gained him an appointment on the Board of Naval Commissioners. He still continued to write minor satires and humorous sketches, and in 1831 published the very successful novel, *The Dutchman's Fireside*, and in 1832 *Westward Ho!* which attained to a similar popularity. These were followed by a popularly written *Life of Washington* (1835), and *Slavery in the United States* (1836), in which the institution is defended on social, economical, and physiological grounds. In 1837 Van Buren appointed him Secretary of the Navy. Four years later he retired to a country residence at Hyde Park, New York state, where he died, April 6, 1860. The well-known patter lines, 'Peter Piper picked a peck of pickled peppers,' &c., occur in his satirical novel *Koningsmarke* (1823). Four vols. of his *Select Works* were edited by his son (New York, 1867–68).

Pauli, REINHOLD, a no less learned than genial historian of England, was born in Berlin, 25th May 1823, studied at Bonn, next paid a long visit for purposes of study to England and Scotland, spent the year 1848 at Oxford, and acted from 1849 till 1852 as private secretary to Bunsen. In 1855 he returned to Germany and *habilitated* at Bonn, whence he was called to a chair at Rostock in 1857. He obeyed a call to Tübingen in 1859, but during the war of 1866 he was punished by being sent to the little *seminar* at Schönthal for an article on the policy of Würtemberg in the *Preussische Jahrbücher*. But he soon left this place, and was appointed to a chair at Marburg in 1867, at Göttingen in 1870. He died at Bremen, 3d June 1882. Pauli's life-long studies were devoted to English history, and the value of his work had long been known to students before it was recognised by the D.C.L. degree conferred by Oxford in 1874. His excellent book on Alfred (1851; Eng. trans. 1852)

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induced Lappenberg to commit to him the task of continuing the *Geschichte von England* in the great series of Heeren and Uckert. Pauli's part (vols. 3–5, Gotha, 1853–58) begins with Henry II., and comes down to the accession of Henry VIII., and, while portions of its ground have been more fully treated since, remains still the best history of mediæval England. Other works are *Bilder aus Alt-England* (1860; Eng. trans. 1861), *Geschichte Englands seit den Friedenschlüssen von 1814 und 1815* (3 vols. 1864–75), *Simon von Montfort* (1867; Eng. trans. 1876), *Aufsätze zur englischen Geschichte* (1869; new series, 1883), besides an admirable edition of Gower's *Confessio Amantis* (3 vols. 1856).

Paulicians, a dualistic Eastern sect, who owe their name to their peculiar reverence for the apostle Paul and his writings. Their founder was Constantine of Mananalis, near Samosata, who felt it his mission to revive what he conceived to be the pure Christianity of St Paul, adopted the name Silvanus, and founded his first congregation at Cibossa in Armenia about 660. He was put to death by the emperor's order in 687, his successor, Titus, in 690; whereupon the adherents of the sect fled to Episparis under the Armenian Paul as leader. Later heads were Gegnœsius, Baanes, Sergius, who carried them from the persecutions of Leo the Armenian to Argaeum in Saracen Armenia, Karbeas, who built the cities of Amara and Tephrica for the remnant saved from the Empress Theodora's merciless severity, and Chrysocheres, with whose defeat and death by the soldiers of the Emperor Basil their power was finally broken. In 970 some of their remnants were transferred by the Emperor John Tzimisces to Philippopolis in Thrace; a century later great efforts were made for the conversion of these, and the new city of Alexiopolis built opposite for the converts. The sect, called *Popelicans* by Villehardouin, continued to exist in Thrace into the 13th century. And it has been affirmed that remnants survived at Philippopolis and in Bulgaria into the 19th century. The Cathari (q.v.) and Bogomili (q.v.) were similar or related sects.

The system of doctrine of the Paulicians was dualistic, the Evil Spirit being regarded as the author and ruler of the visible universe, the Good Spirit of the future world. The only Scriptures which they accepted were the four Gospels, fourteen Epistles of Paul, the three Epistles of John, James, Jude, and an Epistle to the Laodiceans. They rejected the title of *Theotokos*, refusing all worship to the Virgin, as well as any reverence to the symbol of the cross, and even the outward administration of the Lord's Supper and baptism. Photius, Petrus Siculus, and others identified them erroneously as a branch of the Manichæans, the fact being that they anathematised Manes, and only resembled his followers in maintaining a dualistic system. Gieseler and Neander trace them back to the Gnostic Marcionites.

See the Church Histories of Gieseler and Neander; F. Schmidt, *Hist. Paulic. Orientalium* (Copen. 1836); and Lombard, *Pauliciens, Bulgares, et Bons-hommes* (Geneva, 1879).

Paulinus, missionary to Northumbria, counted as the first of the archbishops of York. He was a native of Rome, and may have been named Rum before his conversion. He was sent on his mission by Gregory in 601, and first laboured under Augustine in the evangelisation of Kent. By him he was consecrated bishop in 625, when he accompanied Ethelburga on her marriage to the still heathen Edwin, king of Northumbria. For a long time he made no progress in his mission beyond baptising the infant princess; but at length a great gathering was held at Goodmanham, near York, to consider the matter, and in consequence Edwin and his court submitted to baptism at York, in a wooden chapel dedicated to St Peter, the foundation of the Minster, Easter Sunday 627. Paulinus now carried the gospel over Northumbria, but after six years' constant labour the death of Edwin in battle at Hatfield put a sudden end to his work. He did not wait for the honour of martyrdom, but went back with the widowed queen to Kent. In the same year he received the *pallium* as Archbishop of York from Rome, but he never returned, dying on October 10, 644. He was buried in the chapter-house at Rochester. See Dr Bright's *Chapters of Early English History*, and vol. i. of the *Lives of the Archbishops of York*.

Paullinia. See GUARANA.

Paulownia, a genus of trees belonging to the Scrophulariaceæ, with but one species, *P. imperialis*, a native of Japan, and now grown in the United States. It has heart-shaped leaves, and large panicles of purplish flowers. The name is derived from that of a Russian princess Paulovna.

Paul's, ST. For the Cathedral, see LONDON; and for the school, see ST PAUL'S.

Paulus, ÆMILIUS. See ÆMILIUS, GREECE, SCIPIO AFRICANUS MINOR.

Paulus, HEINRICH EBERHARD GOTTLOB, one of the pioneers of German rationalism, was born at Leonberg, near Stuttgart, 1st September 1761. His father's scepticism about the resurrection was cured effectually by a promised appearance of his wife after death, and not unnaturally was succeeded by an eager belief in spiritual visions which brought about his deposition from the office of *Diakonus*. The son studied at the Tübingen seminary, travelled in England, Holland, and France, and was called in 1789 to the chair of Oriental Languages at Jena, which he exchanged in 1793 for that of Theology. Here he produced his laborious but little read *Philologisch-kritischer und historischer Commentar über das Neue Testament* (4 vols. 1800–4); *Clavis über die Psalmen* (1791); *Clavis über den Jesaias* (1793). In 1803 he accepted the chair of Theology at Würzburg, next filled scholastic offices at Bamberg, Nuremberg, and Ansbach, and again in 1811 accepted a chair as professor of Church History at Heidelberg. Here he died, August 10, 1851. Of his numerous works the most important were his *Leben Jesu, als Grundlage einer reinen Geschichte des Urchristenthums* (2 vols. 1828), and *Exegetisches Handbuch über die drei ersten Evangelien* (3 vols. 1830–33). His chief critical principle is an assertion of the impossibility of the supernatural, and the miracles of Christ he therefore explained as due to a variety of mistaken opinions and errors in narration—a series of exegetical miracles postulated to get rid of the historical. Paulus lived long enough to see his own rationalistic theory of Scripture give place to the more scientific *mythical* theory of Strauss, and that in its turn shaken to its foundations on the one hand by the Tübingen school, on the other by Neander and his school.

See Paulus' *Skizzen aus meiner Bildungs- und Lebensgeschichte zum Andenken an mein 50-jähriges Jubiläum* (1839), and Reichlin-Meldegg's *Paulus u. s. Zeit* (1853).

Paulus Ægineta, a celebrated Greek physician, was born in the island of Ægina, and flourished most probably during the conquests of the calif Omar in the 7th century. Of his life we know almost nothing more than that he pursued his medical studies first at Alexandria, and afterwards in Greece and other countries. He had much knowledge and skill in surgery and obstetrics, and his *Synopsis of the Medical Art* has gone through many editions both in its original Greek and in Latin, English, and other translations.

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Paulus Diaconus, the greatest of the Lombard historians, was born at Friuli about 720. He instructed Adelperga, daughter of King Desiderius, and most probably resided at the court of her husband, Arichis, Duke of Beneventum. He became a monk, probably of Monte Cassino, about 774, but seems later to have spent some years at the court of Charles. He died before the coronation of Charles as emperor, therefore not later than 800. Of his works the earliest is the *Historia Romana*, an epitome of events based on Eutropius, with additions compiled from Orosius, Jerome, and Jordanes. This work was again extended with interpolations by Landolf the Wise (*c.* 1000), and the whole compilation has been known as the *Historia Miscella;* there are editions by Eyssenhardt (1869) and Droysen in *Mon. Germ. Hist., Auct. Ant.* ii. The *Historia Langobardorum* comes down to the death of King Liutprand (744), and is largely compiled from Gregory of Tours, the *Origo Gentis Langobardorum*, the short history (*De Gestis Langobardorum*) by Abbat Secundus of Trent (died 612), and other sources. His other works are a *Life of Gregory the Great*, compiled from Gregory's own writings and from Bede; *Gesta Episcoporum Mettensium*, written at the request of Bishop Angilram, containing an interesting account of the rise of the Carolingian house, the founder of which was Arnulf, Bishop of Metz (ed. in Pertz, *S.S.* ii.); an *Epitome*, or extracts from the *De Significatione Verborum* of Sextus Pompeius Festus (ed. by K. O. Müller); a *Book of Homilies*, consisting of 298 sermons selected from Ambrose, Augustine, Chrysostom, Gregory, Jerome, and Leo; *Poems*, in honour of St Benedict, in praise of the Lake of Como, &c. (ed. by Dümmler in the *Monumenta Germ. Historica, Poetarum Latinorum Medii Ævi*, i.); and *Letters*, to Adelperga, Adelhard, Charles, and others.

Paul Veronese. See VERONESE.

Paumota. See LOW ARCHIPELAGO.

Paupers. See POOR-LAWS, IMMIGRATION, MENDICANCY, VAGRANTS.

Pausanias, a famous Spartan regent and general, the son of Cleombrotus, and nephew of Leonidas. He commanded the confederate Greeks in the important battle of Platæa (479 B.C.), in which the Persians were totally routed, and their leader, Mardonius, slain. He then marched his troops against Thebes, and compelled the inhabitants to give up the chiefs of the Persian party to him for punishment. Elated by this victory, however, he became in an extreme degree haughty and vainglorious, took all the credit to himself, and allowed none to the Athenian generals, Aristides and Cimon, who commanded under him, and treated all the other Greeks as if the Spartans were their lords. Nevertheless, he still continued his conquests, capturing Cyprus and Byzantium. It was here he first began to play false to Greece. He entered into secret negotiations with Xerxes, with the view of becoming ruler, under the Persian monarch, of the whole country, and, in his journey through Thrace, even adopted the dress and luxurious habits of a Persian satrap, and surrounded himself with a bodyguard of Persians and Egyptians. He was recalled, on account of these things, by the Spartans, but his former services procured his acquittal. He then returned to Byzantium, where he renewed his traitorous intrigues, was expelled from the city for a criminal assault upon a Byzantine lady, withdrew to the Troad, and there continued his treachery. He was a second time called to account by the Spartan ephors, but again escaped, though with greater difficulty. Yet his passion for the sovereignty of Greece, even though at the expense of the national liberties, once more drove him to play the traitor. He tried to stir up the Helots, but was taken in his own net. A Helot betrayed him. When Pausanias found his position desperate he took sanctuary in a temple of Athena. Hereupon the people blocked up the gate of the temple with heaps of stones, and left him to die of hunger, his own mother depositing the first stone.

Pausanias, one of the most eminent of Greek geographers and historians, was probably a native of Lydia in Asia Minor, and flourished under Hadrian, Antoninus Pius, and Aurelius. He travelled through almost all Greece, Macedonia, and Italy, and also through part of Asia and Africa, and composed from his observations and researches an *Itinerary* of Greece (*Hellados Periēgēsis*) in ten books, describing the different parts of that country, and giving a particular account of the monuments of art and of the legends connected with them. His style is unpretentious and easy, although devoid of any special literary grace, but his *Itinerary* possesses the rare merit of being the work of an honest and accurate eye-witness. Pausanias was a man of marvellous industry, and is one of the earliest examples of the antiquary in the full modern sense of that word. Even in his treatment of works of art he is ever the antiquary rather than the critic, and his observations seldom rise out of the prosaic atmosphere proper to the catalogue. But he has the saving grace of accuracy, and his work, bare and meagre as it is, remains one of the most precious records of antiquity that we possess. He has not grasped the distinction between legend and history; or, more correctly, dominated by the instinct of the collector, he has recorded everything that he learned, historical fact and local legend alike. Hence his work is a mine of wealth to the student of mythology and folklore, no less than to the archæologist proper.

The best editions are those of Siebelis (5 vols. 1822–28) and of Schubart and Walz (3 vols. 1838–40)—the latter reprinted in Teubner's series (2 vols. 1862). There are English translations by A. R. Shilleto and J. G. Frazer. See also Kalkmann, *Pausanias der Perieget* (1886); and Margaret Verrall's *Mythology and Monuments of Ancient Athens* (1890).

Pavement, flat stones or 'flags,' seldom exceeding 4 inches in thickness, used for covering footpaths, courtyards, kitchens, &c. (see FLAGSTONES). The name is also given to the stone covering of the carriage-way of streets. The Romans paved both their streets and their highways with stones in a most substantial manner, but until the 12th century mediæval cities were almost all unpaved. At Pompeii the stone pavement of the narrow streets remains in the same state as it was before the city was destroyed, and shows the ruts made by the bigæ or carriages. It is formed of polygonal blocks of stone, like cyclopean masonry, the largest pieces being about 3 feet across the face. This kind of ancient Roman pavement, the remains of which are found at other places in Italy, is laid on a carefully prepared basis or foundation, sometimes composed of several layers of suitable materials.

Modern streets in Europe and elsewhere are still most largely paved with hard stones of various kinds, roughly dressed into oblong blocks, say 12 in. by 4 in. and 6 in. deep, and smaller sizes. These are generally laid on a foundation of sand or very fine gravel, sand being also used for filling up the joints. But the jointing is now sometimes done with pitch. Granite and some varieties of Basalt (q.v.) are extensively quarried for these paving-stones.

Wooden pavement consists of pieces of wood (in northern Europe usually that of *Pinus sylvestris*) about the size of paving-stones, laid end up on boards, with asphalt or concrete below them, and

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with the joints of the wood blocks pitched. Vehicles make least noise on this kind of pavement, which, though expensive to maintain, if under heavy traffic, continues in favour. Asphalt pavement is also a good deal used both for foot and carriage ways. It is described under ASPHALT. Both this and wood pavement are apt to be slippery in wet, and the latter in frosty, weather.

For foot-pavement a Portland cement concrete has been much employed of late years. Small stones, such as granite, crushed into small chips like beans, or not much larger, are mixed with the cement, which is laid on a bed of broken whinstone or 'road-metal.' Pavement so made is cheaper than when flagstones are used, but longer experience of it is necessary before we can say that it is in the long run more economical. The frequent necessity for lifting pavement when laying down or repairing gas or water pipes is a great drawback to the keeping of it in good order.

Pavi'a, a city of Northern Italy, on the left bank of the Ticino, 2 miles above its confluence with the Po, and 21 miles by rail S. of Milan. A covered brick bridge (1353) connects the city with the suburb of Ticino, on the right bank of the river. Pavia is still in great part surrounded by walls, and has an imposing appearance; in former times it was called the 'city of a hundred towers.' Its oldest church is the Lombard basilica of San Michele, which, although the date of its foundation is uncertain, is mentioned as early as 661. The early 'kings of Italy' were crowned within its walls; in 1863 it was granted the title of 'royal basilica,' and was restored 1863–76. The cathedral, containing some good paintings, was commenced in 1488, but was never finished. It shelters the tomb of Boëtius (brought from St Peter's) and Roland's lance; and in a beautiful chapel attached to it are the ashes of St Augustine, in a Gothic sarcophagus ornamented with a great number of bas-reliefs and figures. The Certosa, which lies 5 miles north of the city, is described in a separate article. The castle of the Visconti (begun in 1360), a massive square arcaded structure, once contained valuable collections of MSS., armour, and curiosities, but they were carried away by the French in 1500. The university is said to have been founded by Charlemagne, and was a famous seat of learning during the middle ages; but it was not formally constituted a university until 1361. It is now attended by 1000 students (1800 about 1850), who are taught by sixty teachers. Attached to it are two colleges—Borromeo (1563) and Ghislieri (1569)—for poor students, and a library (1772) of 185,000 vols., anatomical and natural history museums, a botanic garden, a school of the fine arts, &c. There is neither much industry nor much trade. Pop. (1881) 29,836.

Pavia, the ancient *Ticinum* (afterwards *Papia*, whence the modern name), was founded by Gallic tribes, and was sacked by Attila (452) and by Odoacer (476); Theodoric selected it as his capital after 489. Later on the Lombards made it their capital, and then it became the chief city of the kingdom of Italy. Through jealousy of Milan it sided with the emperors (1056–1356); it was then conquered by the Visconti, and subsequently shared the fate of Milan. It was sacked by the French in 1500. Here in 1525 the French were defeated by the imperialists, and Francis I. (q.v.) taken prisoner; but in 1527, and again in the following year, the city was taken and laid waste by the French. It was stormed and pillaged by Napoleon in 1796, and came into the possession of Austria by the peace of 1814. Since 1859 it has been included within the kingdom of Italy. Lanfranc and Pope John XIV. were natives.—The *province* of Pavia (1312 sq. m.) has a pop. of (1889) 513,983.

Paving. See PAVEMENT.

Pavlograd, a town of South Russia, 45 miles by rail ENE. of Ekaterinoslav, on an affluent of the Dnieper, was founded in 1780 by Zaporogian Cossacks. Pop. 14,442.

Pavonidæ. See PEACOCK.

Pawnbroking. Pawn is a contract whereby the owner of a thing delivers it to a creditor as security for a debt contracted by himself or by a third party. This contract is of great antiquity, as may be seen on referring to the story of Judah and Tamar (Gen. xxxviii.) and the provisions of the Mosaic law (Exod. xxii.). In modern times the superior class of money-lenders have often advanced money on pledges of plate, &c.; this was the business carried on by the Lombard traders, from whom Lombard Street in London takes its name; and it is said that the three golden balls which figure over every pawnshop were taken from the armorial bearings of the Medici family. Property of considerable value is sometimes pawned with bankers and others; and an equitable Mortgage (q.v.) may be described as a kind of pawn. Among the poorer classes, clothes, tools, &c. are frequently pledged when money runs short; like other small money-lenders, the pawnbroker is regarded by his customers as an extortioner, though the profits of the trade are not particularly high. On the Continent efforts have been made to supersede the pawnshop by establishing what are called Monts de Piété. In England a quasi-charitable institution of the same kind was started in 1708, but it came to a disastrous end in 1731; another scheme, started during the bubble mania of 1824–25, was equally unfortunate. In Ireland there were, in 1841, as many as eight Monts de Piété, but they had all disappeared by 1853. On comparing the rules and charges of the Mont de Piété (q.v.) at Paris (the largest establishment of the kind in the world) with those of English pawnbrokers, it does not appear that there is any striking superiority in the French system. It is understood that the Paris establishment is superior to the London pawnshop in two points—it charges a lower rate of interest, and it gives greater facilities for recovering stolen goods. On the other hand, it is said that officialism, which must prevail where a large staff is employed, makes it more difficult for the poor to obtain advances.

The rules of English common law which apply to a contract of pawn are founded in part upon the Roman law. The pawnbroker acquires what is sometimes called a special property in the goods deposited; he has a right to retain them, and, if the debt be not paid within the stipulated time, he has a right to sell; if the sale produces more than the amount of the debt, he must account for the surplus. The pawner has a right to redeem at any time before sale; interest is not due unless there is an express or implied contract to pay. These rules are considerably modified by the Pawnbrokers Act, 1872, which applies to all persons who make a business of taking chattels in pawn, including the keeping of what in England are called dolly-shops, and what in Scotland used to be called 'wee brokers.' Every pawnbroker is required to take out a license; unless in business before 1872 he must obtain a certificate of fitness from a magistrate or a petty sessions court before taking out a license. Pawnbrokers are required to keep books in a prescribed form; their shops are made liable to be searched under a magistrate's warrant. A ticket must be given on receiving goods in pawn; the pawnbroker may charge one halfpenny per month on each 2s. advanced; and there is also a small charge for the ticket. These charges are high, or rather would be high if the

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pawnbroker were in the same position as an ordinary money-lender; but it must be remembered that the risks of this business are considerable, and also that the borrower obtains a larger advance by reason of the high interest. Pledges are to be redeemable within twelve months and seven days; if a pledge over 10s. in value is sold for more than the loan and profit due, the pawnbroker must account for the surplus on demand. These rules apply to any loan not above £10; but in the case of a loan of more than £2 the rules of the act may be excluded by special contract. The act extends to Scotland. Special enactments have been made in regard to persons pawning or receiving in pawn property belonging to public authorities—e.g. soldiers' arms and uniforms. See Turner's *Contract of Pawn*, where the statutes relating to this subject are summarised.

The law of the United States is the English law, as altered by the legislation of each state; but the law of Louisiana, which is French in its origin, approximates more closely to the Roman, and is free from the peculiarities of the English system. In New York the rate is limited to 25 per cent. per annum on articles worth less than $25, and to 7 per cent. on articles of higher value. The rate usually charged is, however, 3 per cent. per month, and there are generally further charges for storage and safe-keeping.

Pawnees, a tribe of American Indians (q.v.), who formerly resided in Nebraska, with branches extending into Kansas and Texas. They surrendered their lands south of the Platte by treaty in 1833; suffered much thereafter at the hands of their hereditary enemies, the Sioux; and in 1876 removed, only 2026 strong, to a reservation of 283,020 acres in Indian Territory. In 1887 they numbered only 918. See Grinnell's *Pawnee Hero Stories and Folk-tales* (New York, 1889).

Pawtucket, a city of Rhode Island, on the Pawtucket River, 4 miles by rail N. of Providence. A fall of nearly 50 feet on the river, and its proximity to the sea, caused it to be selected by Samuel Slater, in 1790, as the site of the first cotton-factory in the United States. It now contains numerous large mills, where cottons, woollens, haircloth, and thread are manufactured, besides great calico-printing works, and bleaching and dyeing establishments, &c. Pawtucket was settled about 1655, and became a city in 1886. Pop. (1870) 6619; (1890) 27,633.

Pax. See KISS.

Paxo, one of the Ionian Islands, lies south-east of Corfu, has with the smaller island of Antipaxo (1 sq. m.) an area of 8½ sq. m. and a pop. of 5000, and produces wine, olives and olive-oil, almonds, oranges, lemons, &c. Capital, Gaïon, the seat of a bishop.

Paxton, SIR JOSEPH, English architect and horticulturist, was born at Milton-Bryant, near Woburn, Bedfordshire, on 3d August 1803. He began life as a working-gardener in the service of the Duke of Devonshire, at Chiswick, and was thence transferred to Chatsworth; there he was put in charge of the gardens, and entirely remodelled them, and was made manager of the duke's Derbyshire estates. The experience he obtained in designing capacious glass conservatories at Chatsworth (q.v.) found wider scope in his proposal for a palace of glass and iron for the Great Exhibition (q.v.) of 1851. It was the first time these materials had been employed on so extensive a scale, and visitors found an inexhaustible theme of admiration in a fairy palace so novel, beautiful, and magnificent. His design obtained for him the honour of knighthood. He then designed the Crystal Palace at Sydenham (q.v.), and superintended its construction from the materials of the exhibition in Hyde Park. He also laid out the terraces, and planned the gardens, with their fountains, cascades, &c. Besides publishing a very popular *Cottage Calendar*, he edited the *Botanical Magazine*, *Paxton's Flower-Garden*, *Pocket Botanical Dictionary*, and other works. He died at Sydenham, 8th June 1865, having represented Coventry since 1854.

Paymaster-general, an officer of the British ministry, but not of the cabinet, who is charged with superintending the issue of all moneys voted by parliament, but has no control over the sums issued, paying merely on the order of the department concerned. He is always either a peer or a member of the House of Commons, and changes with the ministry. Sometimes the paymaster-general's post is unpaid, as in 1891. The paymaster-general is assisted by a treasury remembrancer, and deputy-paymaster for Ireland, and a staff of clerks.

Paymasters, in the British army, are either 'regimental' or 'district.' There is one of the former, either a combatant officer or an officer of the army pay department, to every regiment of cavalry (except the Life and Horse Guards) and battalion of infantry. He receives drafts each month on the accountant-general for the various payments which he has to make, and for the sums required by the captains, who then open accounts with some local bank, and draw upon them for cash to pay their men, &c. The amounts of the drafts are based upon monthly estimates, and all expenditure is accounted for in the 'pay-lists.' These are checked by the district paymaster (an officer of the army pay department), and audited at the War Office, any wrong payments being disallowed. District paymasters also make all authorised payments to persons in their districts not dealt with by the regimental paymasters. On active service and whenever local banks cannot be used, cash is carried in 'treasure chests,' which are in charge of the paymaster. The *Paymaster-sergeant* is clerk to the paymaster.

The naval paymaster is for a ship what the military paymaster is for a regiment; but in addition he has charge of the provisions, clothing, and miscellaneous stores, as well as of money. Paymasters (till 1844 called *pursers*) are commissioned officers, and rank, according to service, with lieutenants, commanders, and captains. The paymaster or accountant officer is responsible for all the accountant and victualling duties of the ship, and under the authority of the captain makes now all disbursements for the naval service, the captain being held responsible that all accounts are sent in by the paymaster regularly, and that the balance of cash is correct. Candidates are nominated by the First Lord of the Admiralty, and, if they successfully pass a limited competitive examination, join as assistant-clerks. They must not be less than fifteen or over seventeen years of age. After one year's service, and being seventeen years old on passing the necessary examination, they are rated clerks. After three years' service in this rank, and having passed an intermediate examination, and being twenty-one years of age, they can pass for promotion, and if successful they receive a commission as assistant-paymaster, ranking first with sub-lieutenants, and after five years' seniority with junior lieutenants. From this time on their promotion, except in very rare cases, goes by seniority to paymaster, staff-paymaster, fleet-paymaster, who ranks with a commander, and paymaster-in-chief. This latter rank, however, is only given on retirement. The pay of an assistant-clerk is 2s. 6d. a day, that of a clerk 4s., while an assistant-paymaster's ranges from 5s. to 11s. 6d. a day according to seniority, with an additional allowance

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of 2s. 6d. a day when in sole charge of a ship. The pay of paymasters, staff and fleet, &c. rises according to length of service from 14s. to a maximum of £1, 13s. per diem. All secretaries to flag-officers and the secretaries' clerks are now taken from the paymasters and assistant-paymasters.

Payn, JAMES, a prolific novelist, was born at Cheltenham in 1830, and educated at Eton, Woolwich Academy, and Trinity College, Cambridge. In 1855 he published a volume of poems, in 1858 succeeded Leitch Ritchie as editor of *Chambers's Journal*, and in 1882 Leslie Stephen as editor of the *Cornhill Magazine*. Of his hundred novels may merely be named here *Lost Sir Massingberd, A Woman's Vengeance, Carlyon's Year, Not Wooed but Won, By Proxy, Thicker than Water, The Talk of the Town*, and *The Heir of the Ages*. These stories maintain a fair average of merit, below which they seldom fall, but above which they never rise. A characteristic note is a somewhat thin vein of humour, which is seen again in *Some Private Views* and *Some Literary Recollections* (1886).

Payne, JOHN HOWARD, the author of *Home, Sweet Home*, was born in New York City on 9th June 1792, made his début as an actor there in February 1809, and in 1813 appeared in London. For thirty years he had a successful career as actor and author of plays, chiefly adaptations. The best known were *Brutus, Charles II.*, and *Clari*, which contains the celebrated song for which Payne's memory is cherished. Its music is supposed to have been adapted from a Sicilian air by Sir Henry Bishop. Payne was appointed American consul at Tunis in 1841, and died there, 10th April 1852. It is a singular fact that the man who wrote *Home, Sweet Home* had never a home during the last forty years of his life, and died in a foreign land. His remains were, however, taken to America, and buried at Washington in 1883. See his *Life and Poems*, edited by G. Harrison (Albany, 1875; new ed. 1885), and C. H. Brainard's *J. H. Payne* (1885).

Paysandú, the chief town of the Uruguayan department of that name (5115 sq. m.; 28,417 inhabitants in 1887), is built upon a hill gently sloping from the Uruguay River, 280 miles by rail NW. of Montevideo. It is a busy port, and contains large slaughter-houses, &c. Tinned meat, especially tongues, is exported. Pop. 13,000.

Paz, LA. See LA PAZ.

Pea (*Pisum*), a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ. Two species, supposed to be natives of the south of Europe and of the East, are very extensively cultivated for their seeds (peas), which are the best of all kinds of pulse—the Common Pea or Garden Pea (*P. sativum*) in gardens, and the Field Pea (*P. arvense*) in fields; both of them climbing annuals, with pinnate leaves, ovate leaflets, and branching tendrils in place of a terminal leaflet; the garden pea distinguished by having two or several flowers on each flower-stalk, the flowers either red or white, more generally white, and the seeds subglobular; the field pea having one flower on each flower-stalk, the flowers always red, and the seeds angular from crowding and compression in the pod. But it is not improbable that they are truly one species, of which the garden pea has, through cultivation, departed farthest from the original type. Peas have been cultivated in the East from time immemorial, although the ancient Greeks and Romans do not seem to have been acquainted with this kind of pulse. Its cultivation was apparently introduced into Europe very early in the middle ages; and it now extends from warm climates, as India, even to very cold latitudes, the plant being of rapid growth and short life. The pea does not appear to have been cultivated in England even in the time of Elizabeth. According to Fuller, they were then brought from Holland, and were accounted 'fit dainties for ladies, they came so far and cost so dear.' The seeds of the garden pea are used for culinary purposes both in a green and in a ripe state, as are also the green succulent pods of some varieties, known as Sugar Peas or Wyker Peas, in which the membrane lining the inside of the pod—parchment-like in most kinds—is much attenuated. Field peas are used both for feeding cattle and for human food. For the latter purpose peas are often prepared by being deprived of the membrane which covers them, in a particular kind of mill; they are then sold as *Split Peas*, and are much in use for making *Pea Soup*. They are also ground into meal, which is used in various ways, chiefly for making a kind of pottage and unleavened bread. In the countries bordering on the Mediterranean peas are roasted in order to eating.

There are innumerable varieties of the garden pea, but very few of the field pea, those of the former being so much the products of horticultural art that they cannot be preserved without the utmost attention. Some of the kinds of garden peas have long stems, and require for their support stakes 6 or 8 feet in height; others are of humbler growth; and certain dwarf kinds, preferred as most convenient in many gardens, succeed very well without stakes. The largest kinds are sown in rows about 4 or 6 feet asunder. In Britain garden peas are sown at different times from January to the end of June in order to secure a supply of green peas during a considerable part of summer and autumn; and in the southern parts of the island they are also sown in the end of autumn, a very little protection being sufficient for them during the winter. In the United States early peas are sown either in November or in February or March. Certain small kinds of very rapid growth, known as *Early Peas*, formerly preferred for the first sowings, although less productive than many others, are now being supplanted in the estimation of gardeners by larger and superior flavoured sorts, which combine the desirable quality of extreme earliness with the size and tenderness of the *wrinkled marrow* kinds.

Chalky and other calcareous soils are particularly suitable for peas, if to be used green, and in other soils a good field-crop is seldom obtained unless the land has been well limed, or manured with gypsum. The free use of lime is found to be unfavourable to the quality of field peas which are intended for human food, as peas from soil so treated do not readily melt or 'fall' in boiling, and are therefore more indigestible.

Market-gardeners in good districts in England find the pea a most profitable crop. Surrey, Bedfordshire, and Essex are the principal counties whence the supply for the enormous demand for green peas for Covent Garden Market is chiefly drawn. Supplies also are received from France in May, but are inferior in quality to the English. Peas are cultivated to a considerable extent as a field-crop in Britain, but are best adapted to those districts in which the climate is least moist, the seeds being very apt to grow in the pods when moist weather prevails in autumn, by which the crop is injured or destroyed. The most productive kinds, being also in general the most bulky in straw, are very apt to lodge before the pods are filled in wet seasons, and particularly on rich land. The crop is, therefore, rather a precarious one.

The haulm or straw of peas is used for feeding cattle; and for its sake field peas are often reaped before they are quite ripe, great care being taken

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in stacking the straw to provide for ventilation, so that it may not *heat*. Pea haulm, when cut and dried green, is more nitrogenous and more nutritious than hay.

Land to be sown with field peas should be very *clean*, and in particular free of couch-grass; otherwise the best management cannot prevent its becoming more foul whilst bearing the pea crop. The seed ought always to be sown in rows not less than 20 inches apart. Various means are employed for sowing peas; they are not unfrequently ploughed under the furrow; but the seed ought not to be buried more than 4 inches under the surface. In the harvesting of peas the sheaves are generally left loose till the haulm is somewhat dry. In drying it shrinks very much. *Winter Field Peas*, a variety with very small seeds, are much cultivated in France and Germany, being sown in October, enduring the severest frosts without injury, and ripening very early.

Besides being one of its most important agricultural and horticultural crops, peas are largely imported into Britain, the quantity sometimes reaching 120,000 quarters. The chief sources are Denmark, Germany, Holland, Morocco, the United States, British North America; and of these Denmark and the North American colonies send the greater part. As an article of food, if not taken too often or without other food, peas are very valuable, as they contain a large percentage of *casein*, which is a flesh-forming principle. This principle in the pea has been called *legumin*, but chemists are now generally agreed that it is identical with the casein of cheese. The chemical constituents of peas will be found in the table at DIET, Vol. III. p. 808; and the dietetic value is discussed at FOOD, Vol. IV. p. 719. Tinned peas are much used, but have little of the delightful flavour of this fresh vegetable.

A plant found on some parts of the shores of Britain, as well as of continental Europe and North America, and known as the Sea Pea, has been commonly referred to the genus Pisum, and called *P. maritimum*, although botanists now generally refer it to Lathyrus. It much resembles the common pea; has large reddish or purple flowers on many-flowered stalks; and its seeds have a disagreeable bitter taste. Its abundance on the seacoast at Aldeburgh and Orford, in Suffolk, is said to have saved many persons from death by famine in 1555.—The other species of Pisum are few. But the name Pea is often given to species of other papilionaceous genera. The Sweet Pea (q.v.) and Everlasting Pea are species of Lathyrus. The Chick Pea (q.v.) is a species of Cicer; and the Wood or Heath Pea is *Orobus tuberosus*.—The pods of peas are often injured by the Pea-beetle (*Bruchus pisi*), a small coleopterous insect; by the Pea-maggot, the caterpillar of a moth (*Tortrix pisi*); and by the Pea-weevils (*Sitona crinita* and *S. lineata*), small coleopterous insects.

Peabody, a village and township of Massachusetts, 16 miles NNE. of Boston. Formerly called South Danvers, its name was changed in 1868 in honour of George Peabody, who was born here. The village contains the Peabody Institute, and the township has manufactures of carriages, leather, and glue. Pop. 10,158.

Peabody, GEORGE, American merchant and philanthropist, was born at South Danvers, Massachusetts, February 18, 1795. His parents, who were descended from the Paybodys of St Albans, Hertfordshire, were poor, and his only education was received at the district school. At the age of eleven he was placed with a grocer, and at fifteen in a haberdasher's shop in Newburyport. He was manager of a store in Georgetown for a time; in 1814 he became a partner in the dry-goods house of Elisha Riggs in Baltimore, and head-partner of this firm in 1829. In 1827 he first visited England, where he afterwards settled permanently. He established himself in London in 1837 as a merchant and money-broker, and accumulated a large fortune. He invested largely in United States bonds during the civil war; and this, coupled with integrity, industry, and splendid capacity in finance, was the secret of his marvellous success. As one of three commissioners appointed in 1848 by the state of Maryland to obtain the restoration of its credit, he refused all payment, and received a special vote of thanks from the legislature of that state. In 1851 he supplied the sum required to fit up the American department at the Great Exhibition. That same year he started his 4th of July dinners, which were of some account in fostering good feeling between England and America. During his lifetime Peabody gave away in all more than one and a half millions sterling for philanthropic purposes.

Amongst his gifts were $10,000 to the second Grinnell expedition, under Dr Kane; $200,000 to the Peabody Institute, South Danvers (now Peabody); $50,000 to an institute in North Danvers; $1,000,000 to Peabody Institute, Baltimore; $25,000 to Phillips Andover Academy, and $25,000 to Kenyon College; $150,000 to found an institute of archæology at Harvard, and a like sum for a department of physical science. His two largest gifts were $3,500,000 for the Southern Education Fund, and his contributions towards building industrial homes in London, which in all amounted to £500,000. Recognition of his beneficence was made by the United States government, while the Queen offered him a baronetcy or the Grand Cross of the Bath. He refused these honours, and was asked what he would accept. His reply was: 'A letter from the Queen of England which I may carry across the Atlantic and deposit as a memorial of one of her most faithful sons.' The Queen's letter acknowledged his 'more than princely munificence;' to this she added her portrait, and both were deposited in the Peabody Institute, South Danvers. Peabody testified that his giving was really a triumph over a naturally parsimonious disposition; he lived and dressed plainly. 'The brave, honest, noble-hearted friend of mankind,' as the Hon. R. C. Winthrop called him, died in London, November 4, 1869. The residue of his fortune, amounting to upwards of £1,000,000 sterling, was left to his relatives. After a funeral service in Westminster Abbey his remains were conveyed to America in the English war-ship *Monarch*, and laid beside those of his mother at South Danvers. There are statues of Peabody in London and Baltimore. In 1889 the London Peabody trustees had eighteen groups of industrial buildings in various parts of the city, their rooms being occupied by 20,000 persons. The net gain from rents and interest was £30,000. See *Life* by P. A. Hanaford (1882), and Robert Cochrane's *Beneficent and Useful Lives* (1890).

Peace is a term of important significance in law. International law regards peace as the normal relation of one state to another; this relation is disturbed by war, but when war is over the combatants revert to their former rights, except in so far as these may have been altered by the war. In municipal law peace means the protection accorded to subjects of an established authority; thus, vassals were within the peace of their feudal lord. All subjects are within the peace of the sovereign, and judges and justices are appointed to keep the peace within their respective jurisdictions. A person who commits an assault, or otherwise wantonly invades the rights of another, is

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guilty of a breach of the peace. If a law-abiding person is threatened with injury to himself, his wife or child, or his property, he may seek protection and 'exhibit articles of the peace' before a court or magistrate. Justices are empowered, on sworn information, to bind persons over to keep the peace; parties so bound and their sureties forfeit the amount of their recognisances if they offend. Under a statute of 34 Edward III. parties may be bound over to be of good behaviour. For conservators and justices of the peace, see JUSTICE OF THE PEACE.

The PEACE SOCIETY was founded in London in 1816, chiefly, but not exclusively, by members of the Society of Friends, and was a result of the deep feeling everywhere aroused by the long continental wars terminated by the peace of Paris in 1815. It was from the first a religious body, adopting as the basis of its operations the principle that 'war is inconsistent with the spirit of Christianity and the true interests of mankind.' It has always been unsectarian and international, and has endeavoured to secure the co-operation of Christian men and philanthropists in all countries. It advocates Arbitration (q.v.) as a substitute for war, the ultimate establishment of a code of international law and a court of nations, and the reduction, with a view to the final abolition, of standing armies. This society claims to be the centre of the peace movement, and among its triumphs may be mentioned the solemn recognition of the principle of arbitration in one of the protocols of the treaty of Paris in 1856, secured by a deputation to the plenipotentiaries of the Great Powers. But the most signal token of its influence and success is seen in the fact that since its commencement there have been sixty actual cases of successful arbitration, and a large number of instances in which an arbitration clause has been inserted in treaties. There are in America forty peace societies, and many in Italy, France, Sweden, Denmark, Holland, and Belgium. In England other great associations have been formed under the auspices of the Peace Society. The Workmen's Peace Association, founded in 1870 by members of the Reform League (now the International Arbitration League), is a large organisation of the working-men of London, which has now one hundred honorary agents in different towns. The International Arbitration and Peace Association for Great Britain and Ireland was founded in 1880, and a Universal Peace Congress was held in Paris in June 1889. This proved so successful that it was resolved that such a congress should be held annually in the different great cities of the world (London in 1890, Rome in 1891, &c.).

Peace River, a large river of Canada, rises in two branches in the Rocky Mountains, in British Columbia, and flows north-east to the outlet of Lake Athabasca, where it joins the Slave River by five widely separate mouths. The delta thus formed is, with that of the Athabasca River, the most fertile part of the country. The river has a length of about 1100 miles, but it is much encumbered with rapids. The Peace River was followed by Sir A. Mackenzie (1755–1820) in his expedition of 1792–93 (cf. his *Voyages*, 1801).

Peach (*Amygdalus Persica* of botanists, but now believed on later showing to be of Chinese origin) belongs to the order of Rosaceæ, and is of the drupaceous subdivision. This, the most delicious fruit that ripens in the open air of Britain, is nearly akin to the almond, resembling it closely in wood, leaves, and blossom, but differing widely in the character of the fruit. In the peach the stone is covered, not with a brittle husk, but a fleshy substance, juicy, melting, and of the finest flavour when matured and mellowed. The peach-tree, like the almond, is of moderate stature, more or less spreading, according to variety, deciduous (though some are called evergreen), and, when left to itself, deep-rooted. The leaves (which contain some prussic acid) are lanceolate, on short footstalks, differ much in size, have their edges serrate or crenate, and have glands near the stalk, or are glandless. The serrate leaves, as a rule, are glandless; the crenate have glands, and the glands are either globular or reniform. Gardeners know it to be the case, but as yet know not the cause of it, that mildew (both of fruit and leaf) attacks the varieties with glandless leaves, while the glandulose have immunity. And for this reason *Royal George* (one of the finest of peaches, but having boldly serrate leaves without any glands) is seldom planted now against the open wall where mildew has paid one visit. The many varieties of the peach pass into divisions and subdivisions, according to the point regarded. There is first the decisive difference in the clothing, flesh, and flavour of the fruit, which has established the broad distinction between peach and nectarine. A very close observer is the man who can pronounce in winter, unless the trees happen to be his own, which of twain is nectarine, and which is peach. In summer there is a certain difference, perceptible, but not easily described, in the tint and cast of foliage; while the fruit on the other hand leaves no doubt, even from its first appearance, as to its proper title. Tales have been told on good authority as to the co-existence of the bald and the downy, the nectarine and peach, on the self-same twig, and even of a fruit which was peach on one side of the suture and nectarine on the other. To deny what is outside one's own experience, however large that experience may be, proves it capable of increase; but to doubt the adverse instance is permissible. The present writer has grown hundreds of thousands of peaches, and some myriads of nectarines, but has never seen either become the other, though they often grow amicably on the same branch *after budding*. Peaches and nectarines, while distinguished as above, pass alike into the other three divisions which have been established concerning them—to wit: (*a*) those which have large and those which have small blossoms; (*b*) those which have glandless leaves and those whose leaves are glandular; (*c*) those that have fruit which adheres to the stone and those whose fruit parts freely. Neither of these points affects the other two, and hence arise cross-divisions.

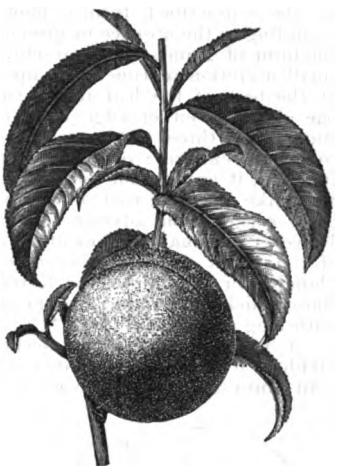

Fig. 1.—Peach.

(*a*) As to size of bloom, it is hard to say why, but all known peaches and nectarines have blossom either very conspicuous or almost insignificant. Other fruit trees have blossom larger or middle-sized, or small, according to variety. Some gardeners fancy that the smaller bloom suffers less

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from the attacks of frost; the larger petals certainly show the nips more sadly, but the internal injury is received in either case. The colour of the blossom ranges from snowy-white to pink and rose (the latter being the most usual tint), and even to bright carmine.

(*b*) The leaves of the peach and nectarine, being as above described, furnish another classification according to the absence or presence of glands, and the form of glands when present. The gland is a small accretion or concretion upon the petiole, or at the base of the leaf itself; sometimes there is one gland at either edge, sometimes two, and at times even three. In form the glands vary from round to reniform; or even lenticular; but their function, if any, is not yet understood. Probably they take no active part, but are merely the tokens of a constitution adverse to fungoid overtures. However that may be, they afford one more division of the peach and nectarine, according as they are glandless or glandulose, the latter subdivided into those which have round and those which are gifted with long glands.

(*c*) Again, the peach and nectarine are palpably divided (according to the inner construction of the fruit) into *clingstones* (or *Pavies*) and *freestones*.

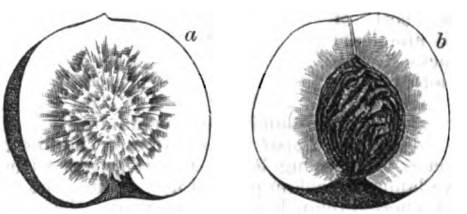

Fig. 2.—Fruit of the *clingstone* (*a*) and *freestone* (*b*) varieties, cut across to show the seed.

In the former the stone seems to radiate, as it were by tentacles, into the flesh, and the eatable part will not quit hold without great loss of the delicious juice. These peaches are therefore only fit to be sucked, for to quarter them fairly is impossible. And it is a sad indictment against the peaches of America that they belong mainly to the non-secable section. But the freestones, chiefly grown in Europe, part from the stone with little rupture of tissue, and melt in the mouth instead of gushing on the plate. All the above being cross-divisions, the classes of the peach grow manifold; but the cultivation is the same with all. When grown on its own roots or on peach-stock the tree is short-lived, and being treated thus in America is worn out in some twenty-five years. In France it is worked upon the almond or the plum; in England the mussel-stock is the most approved; and upon this it attains the greatest age. But grow it as we may, it is impatient of the knife, and must receive its orders at a very early date. In the southern parts of England both nectarines and peaches ripen well upon the open wall, or even on dwarf standards in fine summers, and fruit so ripened is the best of all; but the summers of recent years have much discouraged our faith in nature, which is now becoming confidence in glass.

Though many good varieties have been added lately by the skill of nurserymen, the older kinds are not yet obsolete; and the chief gain, if any, is in the lengthening of the period when ripe peaches of some sort can be gathered out of doors. American kinds, such as *Alexander*, *Amsden's June*, and *Waterloo*, may ripen on the open wall in July; but like other prematurity are little worth. As yet we find nothing arisen newly to surpass our ancient friends *Noblesse*, *Galande*, *Grosse Mignonne*, and the like, well known for many generations, and chiefly of French origin.

[In the United States peaches are grown profitably as far north as 40° N. lat. at least; enormous quantities are sent to the markets, and the fruit, in some form, is brought easily within the reach of all classes. The principal peach-growing states are Delaware, Maryland, Virginia, Pennsylvania, and New Jersey, in this order; but the fruit is also largely cultivated in Georgia, Florida, and Texas for the early market, from near the great lakes all down the Mississippi valley, and in California and Oregon. The canning of peaches is an important industry.]

For description of varieties, see André Leroy's *Dictionnaire de Pomologie; R.H.S. Catalogue of Fruits*, edited by Thompson; Dr Hogg's *Fruit Manual; The Orchardist*, by John Scott; *The Growth of Fruit under Glass*, by Thomson; and the treatises of the late Thomas Rivers.

Peachwood. See DYEING, Vol. IV. p. 138.

Peacock (*Pavo*), a genus allied to pheasants and other game-birds, including at least two species—the Indian and Singhalese *P. cristatus*, domesticated in Britain and other countries, and the Malayan *P. muticus*, inhabiting Java, Borneo, and similar regions. The Indian peafowls live in flocks, especially in mountainous and wooded districts, and are often accompanied by the tiger; though whether the tiger derives benefit from the wariness or flesh of the birds is uncertain. The birds roost in trees, and eat omnivorously—worms, insects, small snakes, seeds, &c. At the pairing season rival males display the well-known beauty of their tail-coverts before their desired mates, and strut about after the fashion of many game-birds. They sometimes fight fiercely with their rivals, and the females sometimes pay court to the males. Polygamy prevails, but there seems no truth in the old stories about the cruelty of the males to their mates. The usual cry is a shrill *Pao*, and strange noises are made by rattling the quills. The females lay, according to the climatic conditions, from April to October; the eggs, of a brownish colour, are numerous (eight to ten), and are laid without a nest in some concealed part of the jungle. At first both sexes are alike in plumage, but after a year or so the males gradually acquire their gorgeous feathers, which are perfected about the third year. It is not necessary to describe these colours, so delightfully familiar to all, but it may be noted that they are for the most part of a physical nature, being due not so much to pigment as to external markings, which produce iridescence. As to the evolution of the eye-like markings, which occur in varying degrees of perfection, we have on the one hand to recognise with Darwin that the more beautifully decorated males are selected by their mates, and on the other hand that we do not know to what precise conditions of feather-growth the marvellous beauty is due. The Javan peafowl is said to be even handsomer than the familiar species. Its 'crest, head, and neck are rich green, the breast bluish green margined with gold, the back bright copper-colour barred with green and light brown, and the upper tail-coverts rich green with gold and copper-colour reflections.' White or pied peacocks occasionally occur as sports, and yet more remarkable is the 'japanned' breed, which seems to have arisen quite abruptly.

The peacock seems to have been well known in Greece after Alexander's Indian expedition, but it was known in Judæa even in the time of Solomon. From Greece it spread to Rome and gradually westwards. In many different ways it has touched human life and fancy: it was the bird of Juno to the Greeks and Romans, and emblematic of a glori-

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fied body to the early Christians; its feathers have adorned many a throne and shrine, and the perverted luxury of the later Roman empire made an entrée of the tongues or brains. The eggs and the young are edible, but domesticated peacocks are now kept almost solely for their beauty's sake, and that at some cost, for they are apt to do mischief both in garden and poultry-yard.

Peacock, THOMAS LOVE, satirist, was born at Weymouth on 18th October 1785, the only child of a London merchant, who died three years afterwards. His boyhood was passed at Chertsey, and for six and a half years he was sent to a private school on Englefield Green, but from thirteen he was self-educated, growing up an accomplished scholar. The chief events of his uneventful life were the loss of his first love (1808); his under-secretaryship to Sir Home Popham on a warship at Flushing (1808–9); his close friendship with Shelley, whom he first met in Wales in 1812, during one of his many walking tours; his employment from 1819 to 1856 in the office of the East India Company, as clerk, correspondent, and chief examiner; his marriage in 1820 to the 'Beauty of Carnarvonshire,' who bore him one son and three daughters, and died in 1852 after twenty-six years of ill-health; and the important part he bore in the introduction of iron steamships to Eastern waters (1832–40). In 1823 he had taken a cottage at Halliford on the Thames, and here he died, aged eighty, on 23d January 1866.

Peacock's literary activity extended over more than half a century. Of his half-dozen booklets of verse, published between 1804 and 1837, the best, *Rhododaphne*, offers nothing so good as some of the gay lyrics scattered throughout his seven 'novels'—*Headlong Hall* (1816), *Melincourt* (1817), *Nightmare Abbey* (1818; its hero is Shelley), *Maid Marian* (1822), *The Misfortunes of Elphin* (1829), *Crotchet Castle* (1831), and *Gryll Grange* (1860). And these 'novels' are interesting chiefly as a study of character—the author's own. A Rabelaisian pagan of the 18th century, egoistic, protean, such was Thomas Love Peacock, and in Thomas Love Peacock we have the Alpha and Omega of his writings. They mirror his likings (for nature, music, the classics, madeira, and good living generally), and his stronger, if exaggerated, dislikes (for field-sports, reviewers, political economy, all things Scotch and American, and, above all, Lord Brougham). They leave on one the impression that the little he did not know was to his mind not worth knowing, that because, for example, he had not been at a university and was not religious, therefore Oxbridge and heaven were beyond his microcosm. They may still find admirers in the cultured few, but the steely wit and erudition of their dialogues can never touch the great heart of the people. They are—trite though it sound—'caviare to the general.'

See Sir Henry Cole's collected edition of Peacock's works, with a preface by Lord Houghton and a memoir by his granddaughter (3 vols. 1875); also an article by Spedding in the *Edinburgh Review* for July 1875, and one by Mr Gosse in vol. iv. of Ward's *English Poets* (2d ed. 1883).

Peacock-stone, the name under which the dry cartilaginous ligaments of some large lamellibranchiate molluscs, as the pearl-oyster, have been sold by jewellers.

Pea-crab (*Pinnotheres*). See CRAB, COMMENSALISM.

Peak, the hilly district of north-west Derbyshire, having Castleton for its capital, 10 miles NE. of Buxton. Measuring some 30 by 22 miles, it is watered by the Dove, Derwent, and Wye, and culminates in Kinderscout (2082 feet), other eminences being Axe Edge (1810 feet) and Mam Tor (1710). The Peak Cavern or Devil's Hole near Castleton penetrates 750 yards; and crowning a rock above the village is Peveril Castle, so named from its first lord, a bastard of William the Conqueror's. The wonders of the Peak were celebrated early by Thomas Hobbes (1666) and Charles Cotton (1683); recent works are by Croston (1862; new ed. 1889), Bradbury (1879), L. J. Jennings (1880), and Leyland (1891), besides others cited at DERBYSHIRE.

Pea-nut. See GROUND-NUT.

Pear. The pear (*Pyrus communis*), a member of the Pomaceæ, a sub-order of Rosaceæ, is a tree very largely cultivated for the sake of its fruit, which contests with that of the peach the first place in the list of the British Pomona, and vastly exceeds it in endurance. The pear is a native of Europe and the more temperate parts of Asia, and is still found wild in Britain, but in that state is of lesser girth and stature, with thorny branches and small harsh fruit, and jagged and sometimes pinnate leaves. Under cultivation the tree attains a height of 40 to 60 feet, with a trunk of a yard or even more in diameter, while the thorns disappear, though in some kinds they linger for years after grafting; the leaves are simple, ovate, serrate, or crenate, and sometimes almost entire, glabrous on the upper surface, sometimes tomentose on the under side while young; the flowers are in corymbs of five to eight or nine or even more, each bloom having five petals, generally white, though in some varieties touched or striped with pink, differing also in size and curve according to variety. The stamens are numerous, and the styles distinct, generally five in number and enclosed within the calyx-tube. With the growth of the fruit the ovaries become united, and form what is called the core, consisting usually of five cells, and each cell has one or two seeds or pips, which in many of the best kinds are imperfect. The fleshy mass which is formed around these constitutes what we call the fruit, differing greatly in form, size, and substance, according to variety, health, climate, and other influences. But the normal form of the pear, when we use the word as one of description, is cylindrical, long, and tapering from the stalk to the part just above the eye, where the diameter is greatest.

The pear-tree is grown upon divers stocks, as well as in many shapes and manners, by English gardeners. (1) As to stock—which partly governs other treatment—gardeners use either pear or quince, (*a*) the pear (which is called the free stock) being raised for that purpose from seed or otherwise, and grafted when strong enough, or budded, with the sort required. This is the way to obtain large trees, lusty and enduring, but loth to give fruit until they have found long experience. *Infœcunda quidem, sed lœta et fortia surgunt.* Whence the old distich—'The man who plants pears is a-planting for his heirs.' This has told much against the liberal stock, but in common with the race of proverbs is exaggerative. (*b*) The quince-stock, shallow-rooted, less vigorous in habit, and of briefer date. Upon this stock the pear, when congenial to it, begins to fruit even in the second year from working, gives larger, more beautiful, and sometimes better produce than it could afford upon its closer kindred, but does not grow to the bulk or stature which nature intended for it. It is a mistake, however, to suppose that the tree so wrought is cut short of life, unless of a nature that spurns the union, as some of the finest pears have always done. Other pears, indeed the great majority, thrive upon the quince for from ten to twenty years; and some kinds there are which show every sign as yet of a life as long and almost

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as large as they could have attained without transmigration. (*c*) Other stocks whereupon the pear will grow are the hawthorn, the Sorbus, the *Cydonia japonica*, and several other members of the pyric race. Some kinds of pear will do well on some of these. But in spite of all local and paradoxic flourish, the stern fact remains that the success is fitful, comparatively brief, and scarcely worth the trouble.

(2) The shape and manner of growth are also manifold. In the northern parts of Great Britain and the bleaker portions of the south the pear—unless it be of an early kind—will not ripen well without the aid of glass or the shelter and warmth of a garden-wall. It is not largely grown under glass as yet, and for many good reasons, though very fine specimens are thus obtained. But as a wall-tree it is to be found in almost all fruit-gardens, and much of the finest fruit is thus produced. There are four modes of training now chiefly in vogue—viz. the old horizontal, the fan-shaped, the rectangular fork (with from two to twenty prongs), and the cordon, diagonal or horizontal, single, double, or treble, &c., and sometimes tortured into spirals. But, wherever the pear will ripen without the absorbed and reflected heat of a wall, the simplest and cheapest form of growth is that which our nurserymen call the dwarf pyramidal—more correctly termed the conical—or, with some few varieties which spurn that form, the less compact outline of the bush. Some diligence is needed at least twice a year to keep any of these in discipline.

(3) The varieties of pears are almost countless, as are those of apples, and nine-tenths are unworthy of the census. If this was so in the time of Virgil, we must not be surprised at the catalogue now. No year, however barren, lacks new kinds on paper, which are to supersede all previous issue. But the historical fact survives that pears were as well worth eating in the days of our ancestors as they are now, and that not more than some half-dozen of the hundreds introduced within the last forty years have earned their too obsequious welcome. And of this select band there are only three that deserve to be a joy for ever—*Doyenne du Comice* (perhaps the crown and the criterion); *Beurré superfin*, a noble satisfaction; and *Joséphine de Malines*, an exquisite refinement. Also there is a grand pear of English origin, the *Pitmaston Duchess*, not of the finest quality, but good enough to be allowed to plead its beauty. To these the gardener will add, according to liking or locality, the best of the older kinds that have stood the test of generations, such as *Jargonelle*, *Williams' Bon Chrêtien*, *Louise Bonne*, *Marie Louise*, *Knight's Monarch*, and *Fondante d'Automne*, and some ten or twelve others, preferring merit to magnitude, and bearing in mind the simple truth, though a stumbling-block to the million, that all fruit is better without wall or glass, when it can be so brought to perfection.

[In the United States the favourite variety is the *Bartlett*, which is exported in large quantities. The *Seckel* is a smaller fruit, but of a more delicate flavour. The states in which the pear is chiefly grown are California, Georgia, and Florida.]

See Hogg's *Fruit Manual*; *The Orchardist*, by John Scott; the Report of Pear Conference at Chiswick; and the *Pomological Dictionary* of André Leroy.

Pear, PRICKLY. See PRICKLY PEAR.

Pearl, a peculiar product of certain marine and fresh-water molluscs. Most shell-bearing molluscs are provided with a secretion with which they line their shells, and give to the otherwise harsh granular material of which the shell is formed a beautifully smooth surface, which prevents any unpleasant friction upon the tender body of the animal. This secretion is laid in extremely thin semi-transparent films, which, in consequence of such an arrangement, have generally a beautiful Iridescence (q.v.), and form in some species a sufficient thickness to be cut into useful and ornamental articles. The material itself in its hardened condition is called *nacre* by zoologists, and by dealers mother of pearl. Besides the pearl lining of the shells, detached and generally spherical or rounded portions of the nacre are often found on opening the shells, and there is great reason to suppose that these are the result of accidental causes, such as the intrusion of a grain of sand, or the frustule of one of those minute siliceous vegetables known as diatoms, or a minute parasite, or even one of the ova of the pearl-oyster itself, which, by irritating the tender body of the animal, obliges it in self-defence to cover the cause of offence, which it has no power to remove. Around this foreign body thin layers of nacre are deposited one after another, like the successive layers of an onion, until the object is completely encysted, and a pearl is formed. The pearl is formed of concentric layers of carbonate of lime of extreme tenuity, but of the same general character as those composing the shell.

The most famous pearls are those of the East; the ancients obtained theirs mainly from Ceylon (Taprobane) and the Persian Gulf, whence many of the best pearls still come. Other pearl-fisheries are in the Sulu Archipelago, off New Guinea, off some parts of the Australian coast, and amongst some of the Polynesian islands. In the Persian Gulf the most important pearl-yielding mollusc is the *Avicula* (*Meleagrina*) *fucata*. It is specially fished for pearls, and yields them in greatest number and of the finest kinds. It has a much smaller shell than the species which has been long known as the pearl-oyster, *Avicula* (*Meleagrina*) *margaritifera*. This last and another species (*A. macroptera*) are also extensively fished for in the gulf; but, though pearls are found in both, they are much more valuable for their shells than for the pearls they sometimes contain. Like the *A. margaritifera*, the *A. macroptera* has also a large shell. All three species are chiefly fished about the Island of Bahrein on the west side of the gulf. The centre of the trade is the port of Lingah, but all the pearls that come hence are called Bombay pearls. A steamer with a diver and diving-dress on board was sent out by an English firm of merchants in 1884 to try to obtain shells and pearls in the deeper water on the east side of the gulf, but the experiment did not succeed.

Of the Ceylon pearl-fishery, which, like the Indian ones on the Madras side of the Strait of Manaar, is under government supervision, and is only allowed at irregular intervals, some account is given at CEYLON, Vol. III. p. 78. The method of fishing may be thus described. The season of the fishery, when permitted, lasts from four to six weeks. For each diver there is provided a diving-stone, weighing about 40 lb., which is fastened to the end of a rope long enough to reach the bottom, and having a loop made for the man's foot. To each boat there is usually allotted a crew of thirteen men and ten divers, five of whom are descending whilst the others are resting. This work is done very rapidly; for, notwithstanding the stories of divers who can remain below for four minutes (see DIVING), the best divers cannot, as a rule, remain longer than eighty seconds below, and few are able to exceed sixty. The greatest depth they descend is thirteen fathoms, and the usual depth about nine fathoms. When the diver gives the signal by pulling the rope he is quickly hauled up with his net and its contents. Probably the

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rarity of accidents from sharks, usually so abundant in tropical seas, is to be attributed to the bustle and to the excitement of the waters during the fishery frightening away those dreaded creatures. The divers are sometimes paid fixed wages, others agree for one-fourth of the produce. When a boat-load of oysters has been obtained it returns to shore, and the cargo, sometimes amounting to 20,000 or 30,000, is landed and piled on the shore to die and putrefy, in order that the pearls may be easily found. In Ceylon, in 1889, in twenty-two days fifty divers brought up 11 million oysters, which sold for 24s. per 1000 shells, the government receiving £10,000 and the divers £3200. When the animals in the shells are sufficiently decomposed the washing commences, and great care is taken to watch for the loose pearls, which are always by far the most valuable; the shells are then examined, and if any attached pearls are seen they are handed over to the clippers, who, with pinchers or hammer, skilfully remove them. Such pearls are only used for setting; whilst the loose ones, being usually quite round, are drilled and strung, and can be used for necklaces, &c.

The pearls vary much in size; those as large as a pea, and of good colour and form, are the best, except unusually large specimens, which rarely occur, the most extraordinary one known being the pearl in Mr Beresford Hope's collection at South Kensington, which measures two inches in length, and four in circumference, and weighs 1800 grains. The smaller ones are sorted into sizes, the very smallest being called seed-pearls. A considerable quantity of these last are sent to China, where they are said to be calcined and used in Chinese pharmacy. Amongst the Romans the pearl was a great favourite, and enormous prices were paid for fine ones. The single pearl which Cleopatra is said to have dissolved and swallowed was valued at £80,729; and one of the same value was cut into two pieces for earrings for the statue of Venus in the Pantheon at Rome.

The finest pearls are found within the mantle of the mollusc, close to the lips of the shell, or in the soft part of the oyster near the hinge of the shell; the worst pearls are those found within the close, coarse fibres of the adductor muscle. At intervals they are found loose in the shell outside the body of the oyster, and may when large get washed out of the shell and thus be lost. Lastly, pearls are often found embedded more or less deeply in the shell, having in some cases escaped from the soft tissues. It is notable that the adherent pearls occur almost invariably in the flat or lower valve; occasionally, it is true, they are found embedded in the rounded or upper valve, but in such cases it is observed that the shell has been found lying at the bottom in the reverse position. The pearls found embedded in or under the 'muscular impression' are always small, irregular, and worthless, similar to those found embedded in the adductor muscle itself. Pearls are found in infinite variety of form, and the consecutive layers vary in brightness, colour, and perfection. The most highly prized pearls are quite spherical, and it is evident from their shape that these must have been formed free in the mantle or in the soft tissues of the mollusc, and not cemented to the shell. Some pearls show defects caused apparently by the contact of new foreign substances, organic or inorganic, such as a grit or film of weed: and in some cases it requires a number of layers to completely hide these defects. Thus every new layer secreted changes the value of the pearl. When a pearl that has been cut from the shell presents a hemispherical surface, it is sometimes called a 'perle bouton;' such a pearl is flat on one side, and rounded or convex on the other. If a solid pearl has an irregular shape, having grown over a rough object, it is known as a baroque pearl. Sometimes warty pearls are hollow, and pass under the name of 'coq de perle.'

Pearl-oysters frequently renovate their shells, and are in the habit of burying such intruders as they cannot otherwise dispose of. Stones, mud, small shells, wood, and especially layers of weed are found thus embedded in shells forming unnatural excrescences on the surface. These protuberances are gradually removed by the oyster secreting thinner layers of nacre on the top of them than on the base until the surface becomes again level. Slowly, but steadily, the exterior surface of the shell decays and disappears, until the foreign substance, of whatever nature it may be, comes within the reach of advancing dissolution, and thus the oyster literally passes a stone or other intruder through its shell. In the Natural History Museum, South Kensington, and in the Museum of Practical Geology in Jermyn Street there are specimens which clearly illustrate the processes of relining the shell and of burying foreign substances. They are flat shells (the lower valves), with a number of the figures of Buddha lying embedded at equal distances apart, on the upper portion of the shell near the lips, but not so deeply buried as to be hidden. These are produced artificially in China; the little figures are slipped carefully below the mantle of the oyster, and the process of deposition covers them with nacre.

The value of a pearl depends upon its size, shape, colour, brightness, and freedom from defects. The most valuable pearls at the present time are those which are perfectly round; the button-shaped ranks next, and then comes the drop or pear-shaped pearl. Perfectly round pearls over 25 grains in weight are extremely scarce, and secure high prices. They are greatly sought after to form the centre of necklaces, and large pearls of this character are safe and very profitable investments. The varying tints and colours of pearls are less difficult to understand than some of their eccentricities of growth. The changing condition of the sea, both as regards purity and temperature, the health of the oyster, accidents, such as the discharge of the inky fluid of the cuttle-fish in the neighbourhood of the oyster, all will probably affect the colours of the successive growth-periods of the pearl. Pearls, when of extraordinary beauty, size, and brilliancy, will sell for sums which appear extravagant.

The chemical composition of the pearl is carbonate of lime associated with a small proportion of organic matter. It is easily affected by acids and fetid gases, and may be calcined by exposure to heat. Its sp. gr. is 2·5 to 2·7. Three varieties of pearls being examined, British, Australian, and Singhalese, the qualitative analyses showed that they all had an identical composition, and that they consisted solely of water, organic matter, and calcium carbonate. There was a total absence of magnesia, and of all the other mineral ingredients of sea-water, from which the inorganic part of pearls must of course be obtained.

The most important marine pearl-fishery on the American continent is that of Lower California, the central point being at La Paz. The largest and finest black pearls which come into the market are the specialty of these fisheries. In Australian waters pearls are fished on the coast of West Australia and of Queensland, and in Torres Strait.

River-pearls are produced by fresh-water mussels in Scotland, Wales, Ireland, various parts of Russia, Germany, Canada, and the United States. British pearls are spoken of by Tacitus and Pliny; and in the end of the 17th century the Scottish pearl-industry was of some importance. The Spey, Tay, South Esk, Doon, Dee, Don, Ythan, and Forth have

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all yielded pearls; and a temporary revival of the industry took place in 1860 and succeeding years. In the United States the chief river-pearl fishery is in the Little Miami, in Ohio; but China is the great headquarters of the trade in river-pearls.

False pearls are made by blowing very thin beads or bulbs of glass, and pouring into them a mixture of liquid ammonia and the white matter from the scales of the bleak, and sometimes of the roach and dace. The scales of the lower part of the fish are very carefully washed and put to soak in water, when the pearly film falls off and forms a sediment at the bottom of the vessel, which is removed and placed in liquid ammonia for future use. This pearl mixture, when of the best quality, is very costly, being as much as £4 or £5 per ounce. For use it is diluted with ammonia, and injected into the glass beads, so as to thinly coat them inside; afterwards the better kinds have melted white wax or mucilage of gum-arabic poured in, which renders them much more durable. In this way are produced imitations of the finest oriental pearls, such as only the practised eye can detect. The art of giving the irregular forms of large pearls to the glass bulbs increases the resemblance; and the glassy appearance caused by the exterior glass coating is removed by exposing it for a short period to the action of the vapour of hydrofluoric acid. *Roman pearls* are lighter, as they have the coating of pearly matter on the outside.

See Streeter's *Pearls and Pearling Life* (1886), and G. F. Kunz's *Gems and Precious Stones of North America* (New York, 1890).

Mother of Pearl. The shells of several species of molluscous animals are popularly known as mother of pearl, those, for instance, of *Avicula macroptera* and of some species of Haliotis. To the shells, however, of *Avicula* (*Meleagrina*) *margaritifera* the term mother of pearl is properly applied. This species has a wide distribution in tropical seas. Macassar mother of pearl, from white-edged shells, is the most highly prized; the Manilla yellow-edged shells are not much inferior; and the shells from some parts of Australia are also of a high quality, but those from Sydney and Auckland are of a gray texture. The poorest shells come from Panamá. By far the greatest supply of mother of pearl is now got from the north and north-west of Australia, but large quantities also are obtained from the Straits Settlements, the Persian Gulf, and the islands of the Pacific. The total annual value of what is imported into England is between £250,000 and £300,000, but much of this is sent to continental Europe.

The shell of the large pearl-oyster is thick, of slow growth, and sometimes measures nearly a foot across. Until the Australian fisheries were commenced about 1865 the supply of mother of pearl was diminishing, while the demand for it was and is constantly increasing. In France about 4000 and in Austria some 8000 persons are employed in working this substance for parts of fine furniture, inlaid-work, fans, buttons, &c. In England it is also largely made into buttons, cutlery handles, and ornaments for papier-mâché boxes, trays, &c.; in China and Japan lacquer work has long been decorated with mother of pearl. In Cashmere it is used for the inscriptions on gravestones; and fish-hooks are made of it in the South Sea Islands. For the beautiful play of its colours, see Iridescence.

Pearl Ashes. See Potash.

Pearl Powder. See Bismuth.

Pearson, John, a learned English divine, was born 28th February 1612, in the same year as Jeremy Taylor, at Great Snoring, Norfolk, the son of the rector of that parish and Archdeacon of Suffolk. He was educated at Eton and at Queen's and King's Colleges, Cambridge, and became Fellow of the last in 1634. Five years later he took orders, and was collated to a prebend in Salisbury Cathedral. In 1640 he was appointed chaplain to the lord-keeper Finch, and soon after was presented to the rectory of Thorington in Suffolk. In 1650 he was appointed preacher at St Clement's, Eastcheap, London, and here in 1659 he published his admirably learned and judicial *Exposition of the Creed*. It was dedicated to his flock, to whom the substance of it had been preached some years before in a series of discourses, and it is still esteemed one of the very ablest works produced in the greatest age of English theology. During the same year (1659) Pearson edited the *Golden Remains of the Ever Memorable Mr John Hales of Eton*, with an admirable preface; and next he had a share in editing the *Critici Sacri* (1660). At the Restoration honours and emoluments were lavishly showered upon him. Before the close of 1660 he was presented by Juxon to the rectory of St Christopher's, in London; was created D.D. by Cambridge, and chaplain in ordinary to the king; installed prebendary of Ely and Archdeacon of Surrey; and made Master of Jesus College, Cambridge. In 1661 he was one of the most prominent commissioners, and the principal antagonist of Baxter, in the famous Savoy Conference; later in the year he received the Margaret professorship of Divinity, and gave up his Sarum prebend and London living; in 1662 he was made Master of Trinity College, Cambridge, and early in 1673 he succeeded Wilkins in the see of Chester. His *Vindiciæ Epistolarum S. Ignatii* (1672) was an able answer to M. Daillè, who had denied the genuineness of the epistles. In 1684 appeared his *Annales Cyprianici*. He died July 16, 1686. Pearson's posthumous works in Latin on sacred chronology were published by Dodwell (1688); his *Orationes*, his *Conciones ad Clerum*, and his *Determinationes Theologicæ* contain much valuable matter, for, as Bentley used to say, Pearson's very dust was gold. Baxter had a hearty respect for the learning and moderation of his weightiest antagonist; Evelyn valued his friendship highly; and Bishop Burnet thought him 'in all respects the greatest divine of his age,' and adds, but apparently without sufficient grounds, that he was 'a much better divine than a bishop.'

Admirable editions of the *Exposition on the Creed* are those by the Rev. Dr E. Burton (1833) and the Rev. Temple Chevallier (1849); of the *Minor Theological Works*, by Canon Churton (2 vols. 1844).

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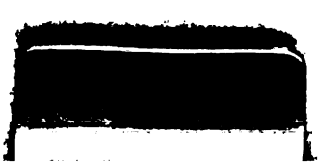

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